

City of Seattle ANNOTATED VERSION (September 5, 2008)
Stormwater Code and Manual 2-2008 Submittal for Ecology Review
Observations and Questions
April 7, 2008

Note: This document provides feedback to various questions, issues, and comments to the Washington State Department of Ecology (Ecology) regarding that agency's review of the from the City of Seattle's proposed Stormwater Code, associated technical criteria contained in the City's Directors' Rules, and supporting documentation, all of which were provided by Seattle to Ecology on February 15, 2008, pursuant to the City's NPDES Municipal Stormwater Discharge Permit. For clarity, Ecology's comments are indicated in Times New Roman font (black) and the City's comments are indicated in Arial font (teal).

Note that the version of the draft Seattle Municipal Code (SMC) 22.800-22.808 Stormwater Code accompanying this document is also dated September 5, 2008.

STORMWATER CODE & ENCLOSURES

Exemptions, Adjustments & Exceptions

SMC 22.800.040.B.3 exempts WSDOT development in the WSDOT ROW that complies with WAC 173-270, the Highway Runoff Program. This should refer instead to the Highway Runoff Manual.

□ **FIXED.**

The WSDOT exemption has been removed in its entirety, based on discussions with Ecology on 5/14/2008.

SMC 22.800.040 applies to the entire subtitle, including *Prohibited and Permissible Discharges* and *Minimum Requirements for All Discharges and All Real Property*. Does the City really intend to exempt WSDOT from these sections? Are the procedures and criteria described in Adjustments and Exceptions really applicable to the entire subtitle? The Permit requires that they be applicable to the minimum requirements for new, redevelopment and construction projects (Seattle's 22.805 and 22.807)

□ **FIXED.**

The WSDOT exemption has been removed in its entirety, based on discussions with Ecology on 5/14/2008.

SMC 22.800.040.D.3, formerly called the "Equally Protective Exception," appears to meet the intent of Ecology's Adjustment criteria. Suggest deleting or incorporating into SMC 22.800.040.C.

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□ **FIXED.**

We deleted it, as it was covered appropriately in the sections under Adjustments.

SMC 22.800.040.D.4 allows exceptions for emergency situations. What is the City's definition of an emergency situation?

□ **RECOMMEND NO FURTHER ACTION.**

Stormwater Code does not provide a definition for "emergency situation" out of concern that we might inadvertently omit a criterion that would preclude decision to act or cause critical delays that could make situation worse. Typical emergency situations could include flooding, landslides, liquefaction, soil creep, settlement, and other situations that put life and property at risk, but it is problematic to define each of these terms *and* to define the level of risk beyond which point the situation becomes an "emergency." The fact that there can be emergency situations that are related to some level of environmental risk, danger, or damage, further complicates efforts to derive a satisfactory definition.

Note that we looked at examples in other City Codes. Seattle's Building Code, for example, allows for issuance of an "Emergency Order" when we find that "any building or structure...is in such a dangerous and unsafe condition as to constitute an *imminent hazard to life or limb*." If the Mayor declares a state of emergency, City has the authority to do rapid evaluations of damaged buildings and hang our green, yellow, and red tags on buildings. The Fire Code talks about "fire and other emergencies" but doesn't define "other emergencies." In an emergency, the fire chief or officer in charge on the scene has broad powers to secure the scene (set up barricades, etc.) and to remove any person or any thing that may be the way of their operations.

Generally speaking, an emergency is work directly related to ending a condition that (1) is an immediate threat to the public or environmental health, safety and welfare or creates an immediate risk of damage to public or private property, and (2) requires remedial or preventive action in a timeframe too short to allow compliance with the application provisions of requesting, reviewing, and approving an exception. The intent is that the work will be the minimum work necessary to end the condition and the work is consistent with the requirements of this subtitle to the extent practicable. Once the Director determines that the condition no longer meets these criteria, all work is subject to the provisions of the Code, including but not limited to the application requirements, and any requirements for technical reports and reviews for work to which the exception applies.

We would be interested if Ecology has definitions from stormwater ordinances from other jurisdictions that seem suitable for us to consider incorporating into our Code.

SMC 22.800.040.D.5 allows an exception when the requirement is not technically feasible. This is inconsistent with Appendix 1 of the permit. The single fact that meeting the requirements is not technically feasible is not enough to qualify a project for an exception. If a requirement is not technically feasible, but the exception would either be injurious to the quality of the waters of

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the state, or not the least possible that could be granted to comply with the intent of the requirements, the exception cannot be granted per Appendix 1 (see Appendix 1 page 28).

□ CITY/ECOLOGY NEED TO DISCUSS.

We believe it is important to reserve the authority of the Director to have the discretion to provide an exception, as contained in our existing Code, on the basis of technical infeasibility, provided that the least possible exception is granted, which is one of the standing conditions for an exception to be granted.

If technical feasibility alone cannot qualify a project for an exception, and an adjustment cannot be identified that provides “substantially equivalent environmental protection,” then there seems to be no other alternatives to compliance and the project must then be denied and not be allowed to go forward. If this is Ecology’s intent, then we need to elevate this discussion.

Consider, for example, requirements in our Code that prohibit stormwater from being discharged into our sanitary sewer system. A number of industries have requested to connect their industrial stormwater to our sewer lines because it is not technically feasible for them to meet their NPDES discharge permit requirements. This technically feasible clause allows the City to make an exception.

Note that we have clarified under “Exceptions”:

An exception shall only be granted to the extent necessary to provide relief from the economic hardship, alleviate the harm or threat of harm, achieve technical feasibility, or perform the emergency work that the Director determines exists. ~~meet the criteria set forth in this section.~~

Note also that technical infeasibility has been incorporated into SMC 22.800.040.C (Exceptions) as one of the four allowed circumstances under which the Director can consider granting an exception:

SMC 22.800.040.D.6.a and 6.c provide for exceptions where there is no reasonable use of the property and where the requirements would cause extreme or unexpected financial hardship. As is, this is inconsistent with Appendix 1 of the permit.

- Same comment as D.5 (above) – the exception cannot be granted if the exception would either be injurious to the quality of the waters of the state, or not the least possible that could be granted to comply with the intent of the requirement (see Appendix 1 page 28)

□ CITY/ECOLOGY NEED TO DISCUSS.

We agree on the need to grant only the least possible exception to comply with intent of the minimum requirements. See above comment.

Appendix 1 (page 28 of 29) states that an exception can only be granted if it “will not increase risk to the public health and welfare, nor injurious to other

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properties in the vicinity and/or downstream, and to the quality of waters of the state.” However, there is no scale or metric provided to the level of injury or the degree of risk. A narrow reading could interpret this requirement to be a zero-risk/zero-injury prescriptive requirement, which could result in virtually all development being halted. We believe this not to be Ecology’s intention. Our intent is to ensure that the Director, when considering a request for an exception, has the authority to exercise discretion in these matters.

See comment above regarding the revised language stating that the exception can only be granted to the extent necessary.

- The language in Appendix 1 is “severe and unexpected.”

□ **FIXED.**

The word “and” has been added. Note that Section 3.4 of Appendix 1 only states “severe economic hardship.” It is in Section 6 of Appendix 1 where the conjunctive “and” is found.

Note also that “extreme and unexpected” has been incorporated into SMC 22.800.040.C (Exceptions) as one of the four allowed circumstances under which the Director can consider granting an exception:

SMC 22.800.040.D.6.b is unusual. What circumstances would this exception address? Ecology needs to understand this better. At a minimum, the same comment as D.5, 6.a and 6.b applies (re: Appendix 1 page 28).

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We would prefer to keep this provision that gives the Director authority to grant an exception should there occur a situation where strict, prescriptive compliance with the Code could “cause harm or a significant threat of harm to public health, safety and welfare, the environment, or public and private property.” Consider a flow control requirement where the only option for compliance would be to install an underground flow control facility in a steep-sloped area. [Note that the proposed Code will result in flow control facilities in creek basins five to 10 times the size of structures designed under the current Code.] The weight of the structure, potential leakage of stored runoff, and construction of the facility itself could pose such risks. In such an instance, it may be that the flow control performance standard cannot be achieved. Our understanding is that the “adjustment” option is not available, because there is no substantially equivalent environmental protection available.

SMC 22.800.040.D.10 lists information that must be provided in a request for an exception. This information is from Appendix 1 of the permit. However, Ecology intends this information to be criteria upon which to base a decision to grant or deny the exception. Seattle’s proposal does not link this “recordkeeping” to the Director’s decision. The criteria in Section 10 must be linked to the reasons for granting an exception under D.5 and D.6 (a and c for sure; need more info on b per above). As written, the criteria in D.10 have no standing in the decision process.

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□ **FIXED.**

Added line in subsection D.7 indicating that the Director will consider the information submitted by the applicant.

7. The Director's decision shall be in writing with written findings of fact. Decisions approving an exception based on severe and unexpected economic hardship shall address all the factors in subsection 8 below.

We also relocated subsection D.10 higher (now D.8) and note that the information is necessary to request an exception based on severe and unexpected.

8. ~~Application for Exception.~~ An request application for an exception on the grounds of severe and unexpected financial hardship must describe, at a minimum, all of the following:

- a. The current, pre-project use of the site; and
- b. How application of the requirement(s) for which an exception is being requested restricts the proposed use of the site compared to the restrictions that existed prior to the adoption of this current subtitle; and
- c. The possible remaining uses of the site if the exception were not granted; and
- d. The uses of the site that would have been allowed prior to the adoption of this subtitle; and
- e. A comparison of the estimated amount and percentage of value loss as a result of the requirements versus the estimated amount and percentage of value loss as a result of requirements that existed prior to adoption of the requirements of this subtitle; and
- f. The feasibility of the owner or developer to alter the project to apply the requirements of this subtitle.

22.800.070 Minimum Requirements for City Projects

Public project vesting is an important consideration, and one that the Ecology team is carefully considering, especially in the context of consistency among jurisdictions.

- 22.800.070.A.2.a – suggest change such that Notice to Proceed for all project phases is given within 18 months of effective date. We don't want incidental land disturbing that may not be commensurate with the entire project (or multiple project phases) to vest the project to older standards.

□ **RECOMMEND NO FURTHER ACTION.**

City does not have formal Notice to Proceed for City projects. Based on internal review & discussions, it is unlikely, given project management, staging and other setup costs, that incidental land disturbing action to vest a City project will occur. We prefer to keep it as written, which requires a City project to commence land disturbing activity within 18 months after the effective date of the ordinance in order for that project to be vested in the 2000 Stormwater Code.

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- 22.800.070.A.2.c.iii – suggest change so that grant applications submitted after the Adoption date be consistent with the new code.
 - **RECOMMEND NO FURTHER ACTION.**
Our intent is to closely link the cutoff date for vesting City projects with the effective date of the ordinance. The January 1, 2009, date was selected as the targeted effective date, but that date may need to be adjusted depending on our projected Code adoption date. We do not want to use the adoption date as the anchor point for vesting, because that would be inconsistent with private projects, which are vested based on the effective date of a new ordinance. Additionally, the process for applying for and accepting grants can be time-consuming, with the potential the some grant applications will be in the approval pipeline on or near the effective date of the ordinance.
- We recognize that 2.a, b and c are “and” clauses, which is good. We need to discuss with you whether a scenario could play out here that a planning and/or conceptual design project (approved by voters or receiving grant funds) could vest the actual design to the older standards.
 - **RECOMMEND NO FURTHER ACTION.**
It is possible to vest earlier designs, but only if the actual land disturbing portion of the project begins within 18 months of the date given in the ordinance. This parallels the provisions granted to private projects that receive development permits.

22.800.080 Authority

If DPD has authority for plan review, etc. per 080.A, how can SPU delegate that authority to DOT in 080.B?

- **FIXED.**
Clarified the DPD authority is for projects *not* conducted in the public right-of-way; SPU authority remains for all other provisions. SPU then is granted authority to delegate public right-of-way responsibilities to SDOT. Also, we added authority for the Director of SPU to delegate responsibilities for certain activities to *either* DPD or SDOT, as there may be programmatic or policy purposes for doing so.

A. For projects not conducted in the public right-of-way, the Director of DPD ~~DCLU~~ has authority regarding the provisions of this subtitle pertaining to grading, review of drainage control plans, and review of erosion control plans, and has inspection and enforcement authority pertaining to temporary erosion and sediment control measures.

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B. 2. The Director of SPU has authority regarding all other provisions of this subtitle pertaining to drainage water, stormwater, drainage, and erosion control, including inspection and enforcement authority. The Director of SPU may delegate authority to the Director of DPD or the Director of Seattle Department of Transportation regarding the provisions of this subtitle pertaining to review of drainage control plans, review of erosion control plans, and inspection and enforcement authority pertaining to temporary erosion and sediment control measures for projects conducted in the public right-of-way.

Integrated drainage plan (080.E) – Ecology is considering this to be a “jurisdiction-wide exception” and is reviewing it as such. See Appendix 1 page 27. Alternately, the IDP could be implemented as an Adjustment. Does an IDP fully mitigate for the development project? Discuss.

□ **RECOMMEND NO FURTHER ACTION.**

An Integrated Drainage Plan (IDP) is a specific type of Adjustment and we want to identify it separately and specifically define it in this section under Authority. A good example of an IDP would be the High Point development project, a 120-acre subdivision that was a partnership project involving SPU, Seattle Housing Authority, and others. Rather than relying on a parcel-by-parcel prescriptive approach, the site integrated street design, infiltration, dispersion, vegetation, green space, and traditional flow control & treatment systems to achieve equivalent (or better) protection. The project enabled SPU to achieve flow control and water quality objectives in the project area at a lower cost than through either development of a large regional drainage and water quality facility, or through retrofit of currently-developed streets.

In answer to Ecology's second questions, yes, an IDP fully mitigates for the project. Note the last sentence in 22.800.080.E and let us know how we can make it more clear.

Voluntary developer agreement (080.G) – This does not appear to necessarily fully mitigate for the development project. What are the criteria for using this authority (e.g. timeframe, basin plan or regional facility component)? The mitigation should be to the same receiving water (as in 080.E). Does this allow a developer to provide flow control or treatment for existing development rather than the project they are implementing? Are they then solving one problems in lieu of addressing the problem they are creating? If so, will Seattle assume complete responsibility for the discharge from the new project site? We are concerned about an “orphaned” unmitigated discharge.

□ **RECOMMEND NO FURTHER ACTION.**

The intent is to fully mitigates for the project. Note the sentence, “...to mitigate the impacts that have been identified as a consequence of the proposed development.” Let us know how we can make it more clear.

Typical examples of how this would be used include: (1) Combining SDOT treatment/flow control facility requirements (triggered by several relatively small

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projects in the same basins). The intent would be to construct a few larger facilities rather than many smaller facilities; (2) Working in partnership with private developers wherein City funds are used to upsize private detention facilities to meet Stormwater Code requirements triggered by roadway projects.

This authority is necessary because we have set our threshold for flow control and treatment for roadway projects so low and have chosen not to use Ecology's Threshold Discharge Area (TDA). Consider, for example, a single project involving multiple sidewalk improvements (such as installing ADA ramps) or a series of projects replacing or installing new covered bus stops, where the total impervious surface area exceeds our threshold. Under Ecology's TDA approach, no facilities would be constructed; however, we believe it is in Seattle's interest to mitigate these impacts. To avoid construction of multiple small facilities, the authority provided in this proposed section of the Code would allow, for example, the total impervious areas to be combined and a single facility constructed that mitigates for the equivalent contributing impervious surface in the same drainage basin. It is a very useful tool that is particularly well suited for fully built environments like downtown Seattle.

Standards, conditions, limitation, protocols, and documentation are all necessary for implementation, but we prefer not to codify the criteria because of how complicated it is likely to be if we need to adjust these later.

Fee in lieu of facility (080.F) – What are the criteria for using this authority (e.g. timeframe, basin plan or regional facility component)? The funds must be spent on a facility discharging to the same receiving water. Section 3.4 of Appendix 1 would allow Seattle to fulfill stormwater requirements in regard to “replaced impervious surfaces” only if you have a plan and a schedule for regional facilities. If you want the fee-in-lieu to apply to “new impervious surfaces” on a project site, the regional facility should be either in-place or constructed soon.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

Our concern in specifically stating, “...to the same receiving water” is that doing so may complicate, rather than clarify the criteria. Analysis of the codes and practices of other jurisdictions implementing a fee-in-lieu program indicates that the point at which *sameness* is determined is not always clear or consistent. We would be interested if Ecology has criteria or processes that seem suitable for consideration into our Code. We believe the phrase, “...that mitigate the impacts identified as a consequence of the proposed development...” sufficiently addresses Ecology's concerns regarding receiving waters.

Note also that the line, “...to the extent allowed by law” is aimed at RCW 82.02.020, which specifies timeframes, mitigation requirements, and other criteria for implementing a fee-in-lieu approach. We specifically did not reference this RCW because it may not necessarily fit all circumstance. It is not clear, for example, how this statute applies when the parties are different departments within the same local government.

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Definitions (22.801)

Adjustment – Definition not consistent with Appendix 1. Do you use the term to refer to “exceptions” as well? May need to revise, build in the 800.040 cross reference, and/or remove footnote.

□ **FIXED.**

The definition (along with footnote) have been removed. Upon review, we think a definition is not required in order to execute the provisions of SMC 22.800.040.

CECSL – definition should reference certification and associated approved training. See Appendix 1 of the permit (page 2).

□ **FIXED.**

Definition reflects the provisions of Appendix 1. See below.

“Certified Erosion and Sediment Control Lead (CESCL)” means an individual who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by the Washington State Department of Ecology.

Land Disturbing Activity – excludes “hot asphalt mix” from compaction associated with stabilization of structures and road construction. What is hot asphalt mix and how is it used?

□ **RECOMMEND NO FURTHER ACTION.**

Hot asphalt mix can be used as an overlay over existing roadway structure. Our understanding of Ecology’s intent in the definition provided in Appendix 1 is that compaction, when it is associated with compacting the native land or existing soil (i.e., affecting vegetative soil cover, non-vegetative soil cover, and soil topography) should be considered land disturbing activity. However, Ecology definition, as written, could also be construed as to apply to compaction of asphalt over an existing roadway. Our injected dependent clause, “..., excluding hot asphalt mix,...” is designed to prevent this. That is, compacting asphalt over an existing roadway should not qualify as land disturbing activity.

Large project – This appears to be used for the “off-site analysis” and tied to Large Project Drainage Control Review. How else is this term used?

□ **RECOMMEND NO FURTHER ACTION.**

Those were two main places where “Large Project” is used. We have deleted the section of 22.805.020.K (Perform Off-site Analysis), which we have determined is not necessary. It is still used in enforcement, where it is stated under 22.808.0110.A (Civil Violations), which is provided below.

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- g. Piecemeal of Projects. It is a violation of this subtitle for any person to knowingly divide a large project into a set of smaller projects specifically for the purpose of avoiding minimum requirements for treatment or minimum requirements for flow control.

We have also added a large project requirement regarding dewatering in 22.805.020.D.12 and 22.805.020.I.

12. Control Dewatering. ...For any project with an excavation depth of 12 feet or more below the existing grade and for all large projects, dewatering flows must be determined and it must be verified that there is sufficient capacity in the public drainage system and public combined sewer prior to discharging.

I. **Ensure Sufficient Capacity.** Projects with an excavation depth of 12 feet or more below the existing grade and all large projects discharging into a public drainage system shall ensure that sufficient capacity exists in the public drainage system and public combined sewer to carry existing and anticipated loads, including any flows from dewatering activities, from the point of connection to a designated receiving water....

Maintenance – definition not submitted; should have a definition consistent with Appendix 1 of the permit. Term is used in several places in the SMC, including 22.807.020.A.e (parks O&M), 22.805.010.C.1 & 2 (utility & roads maintenance exemption).

□ RECOMMEND NO FURTHER ACTION.

We deliberately chose not to define “maintenance” because of our approach to minimum requirements and City-conducted projects. We intend to require certain types of projects to meet minimum requirements for flow control & treatment that would otherwise not be included under Ecology’s requirements as we understand them in Appendix 1 of the Permit. Our examples include: roadway rehabilitation (Seattle’s requirements are triggered when restoration projects requires panel replacements); and utility cuts involving replaced underground pipes; and sidewalk repair/replacement projects. We were unable to arrive at a clear definition for maintenance that worked and determined that the minimum requirements can stand alone independent of a definition for “maintenance.” Our concern is that Ecology’s definition could, conceivable, exclude many activities that result in replaced impervious surface.

In light of the above information, we would be interested in Ecology’s recommendations.

Model, continuous – definition not submitted.

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□ **FIXED.**

Promissory text has been removed. Upon review, we think a definition is not required for continuous modeling, which is addressed in Volume 3 of the Directors' Rules for the Stormwater Code.

Nutrient-critical receiving water – should this definition be tied to an impairment designated through the State's Water Quality Assessment (e.g., those waters reported under section 305(b) of the Clean Water Act, and designated as not supporting beneficial uses due to phosphorus)? How will the Director determine these?

□ **FIXED.**

The definition has been revised. See below.

"Nutrient-critical receiving water" means a surface water that that has been an impairment designated through the State's Water Quality Assessment, reported under section 305(b) of the Clean Water Act, and designated as not supporting beneficial uses due to phosphorus. determined by the Director of SPU to require installation of a treatment facility designed to reduce phosphorus levels in the discharge from a project.

Plan – this definition is limited to drawings. Is this definition also applicable to the Director's Rules, or just as used in the code?

□ **RECOMMEND NO FURTHER ACTION.**

Yes, all definitions in the Code are also applicable to the Directors' Rules.

Receiving water – *ultimate* surface water body, but no definition for surface water. Compare this definition with that of "Watercourse" below.

□ **RECOMMEND NO FURTHER ACTION.**

The term "surface water" is not defined in Appendix 1 or in Ecology's 2005 Stormwater Management Manual for Western Washington (SWMMWW). The intent is to be equivalent to the definition in Appendix 1 for "receiving waters," which is defined as "bodies of water" and "surface water systems" receiving surface runoff via a point source of stormwater or via sheet flow. We believe the intent of Ecology in its definition is to differentiate between surface water and groundwater.

Replaced Impervious Surface – for "other impervious surfaces" means removal down to "earth material." For roadways, this definition does not work. For road surfaces, the removal of the overlying wear surface (asphalt or concrete) down to the "base course" (which is an underlying gravel layer), and subsequent installation of another wearing layer constitutes a replaced impervious surface. Does Seattle consider the gravel base course an "earth material?" Would asphalt-treated base (ATB) be an "earth material?" (Does SDOT use ATB?)

□ **RECOMMEND NO FURTHER ACTION.**

Yes, gravel base course is "earth material" per our definition contained in SMC 22.801.060, which is repeated below:

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"Earth material" means any rock, gravel, natural soil, fill, or re-sedimented soil, or any combination thereof, but does not include any solid waste as defined by RCW Chapter 70.95.

Yes, SDOT does use ATB (essentially bituminous material with crushed aggregate). It can be used for temporary paving for re-routed traffic at a roadway construction site and then, if left in place, can become part of paving section when an asphalt wearing course (typically 3" thick) laid on top. Seattle does not consider ATB to be an earth material.

Watercourse – include lakes, bogs streams and creeks, but not designated receiving waters. Creeks, lakes, bogs are receiving waters. Need to understand how this term works.

□ **RECOMMEND NO FURTHER ACTION.**

The Code limits the use of the word watercourse specifically under minimum requirements that prohibit their obstruction. Obstruction of a designated receiving water (e.g., Duwamish River, Lake Washington Ship Canal) would be outside of the scope of our Code.

Designated receiving water – Ecology must determine this; cannot be decided by Director of SPU alone. Seattle must receive Ecology's concurrence for any additions to the list.

□ **FIXED.**

Definition has been revised. See below.

"Designated receiving water" means the Duwamish River, Puget Sound, Lake Washington, Lake Union, Elliott Bay, Portage Bay, Union Bay, ~~and~~ the Lake Washington Ship Canal, and other receiving waters ~~designated~~ determined by the Director of SPU and approved by Ecology as having ~~the~~ sufficient capacity to receive ~~drainage~~ discharges of drainage water such that a site discharging to the designated receiving water is not required to implement flow control.

Drainage water – includes "surface and irrigation runoff" which is not consistent with IDDE/prohibited discharge requirements in the permit. Ties to source control comments.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We believe that both surface runoff and irrigation runoff need to be included in the definition of drainage water. It could be made more clear if the two terms are made separate as, "...surface runoff, irrigation runoff, ..." and have made that minor change. With respect to surface runoff, that term can be broadly interpreted as overland flow, which we prefer not to prohibit. Our understanding of the Permit is that irrigation runoff is allowed from agricultural sources if commingled with urban stormwater (such as from a neighborhood P-Patch). Discharges from lawn watering and other irrigation runoff is allowed provided such flows are minimized through public education and water conservation efforts, both of which are conducted in Seattle.

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Note that in our Code, we allow as permissible (See SMC 22.802.030.A.9 – Permissible Discharges):

Discharges from irrigation runoff, including irrigation water from agricultural sources that is commingled with stormwater.

but do not allow discharges that contain: chemicals not normally found in uncontaminated water, dirt, fertilizers, pesticides, and yard waste (see SMC 22.802.020.A), which allows the City to prohibit and, if necessary, enforce against discharges of irrigation water containing pollutants.

Minimum Requirements for All Projects – Scope and Exceptions

22.805.010.B – should tie back to Adjustments and Exceptions in 22.800.040.

□ **FIXED.**

The essence of this entire section has been relocated to 22.800.040.A (Exemptions).

22.805.010.C – effectively, these are Exemptions.

□ **FIXED.**

We agree that they are, essentially, exemptions, noting that Ecology uses the term “exempt” when listing road maintenance practices that was originally included in our section under “Waived Minimum Requirements.” We have relocated section 22.805.010.C to 22.800.040.A (Exemptions) so that all the provisions for exemptions are in the same place.

1) for utilities, exempts from flow control and treatment. Needs definition of maintenance.

□ **RECOMMEND NO FURTHER ACTION.**

See comment above under “definitions” and 2) below regarding road maintenance.

Does not mention replacing ground surface with in kind material.

FIXED.

22.805.010.C has been relocated to 22.800.040.A and now reads,

“Maintenance, repair, or installation of underground or overhead utility facilities, such as, but not limited to, pipes, conduits and vaults, and which include replacing the ground surface with in-kind material or materials with similar runoff characteristics ~~is~~ are not required to comply with...”

2) for road maintenance – may need a definition of maintenance.

□ **RECOMMEND NO FURTHER ACTION.**

Defining “road maintenance” will be problematic. There is concern in inadvertently creating a loophole that would relieve certain types of roadway

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projects from our proposal to have treatment and flow control triggered based on new/replaced impervious surface. We prefer not to risk locking a flawed definition into the Code. Consider that there are roadway projects that many would consider maintenance (ergo, not triggering treatment/flow control) that we want to capture, such as mill & overlay, partial reconstruction, full reconstruction, and select panel replacement. We only want to eliminate the mostly crew-led maintenance activities now listed in 22.800.040.A.2.b.(1) through (7).

- 3) continuous model produced no runoff – suggest adding a phrase such as “... and using Best Management Practices in accordance with this code and rules/manuals adopted by the city, ...” to address the fact that Minimum Requirement #5 requires some form of on-site BMP be used.

☐ **RECOMMEND NO FURTHER ACTION.**

We think it's cleaner to keep our Implement Green Stormwater Infrastructure as a stand-alone requirement. We are of the opinion that a site is highly unlikely to produce no runoff unless it is employing one or more green stormwater infrastructure BMPs.

- 5) normal residential activities – footnote citation n/a; where is this defined? Probably ok due to relevance only to structural source control BMP installation.

☐ **RECOMMEND NO FURTHER ACTION.**

We deleted “normal” as a qualifier, but retained the provision. Footnote citation removed to avoid confusion. If Ecology has strong opinion, we can remove this paragraph entirely.

Minimum Requirements for All Projects

Simple discussion needed to clarify what is meant by “all projects.”

☐ **RECOMMEND NO FURTHER ACTION.**

See definitions. “Project’ means the addition or replacement of impervious surface or the undertaking of land disturbing activity on a site.” Intent is for the term to apply to any activity that may result in a need for construction site stormwater pollution or trigger a requirement for a treatment and/or flow control facility. It is a term that is meant to be independent of size, type, or location of the activity.

Construction Site Pollution Prevention

Note that additional construction ESC observations and questions are provided on Volume II later in this document and there may be duplication. In most cases, if the additional detail is or can be provided in Volume II, that detail need not be included in the code.

22.805.020.D – typo. “that” should be deleted from last sentence.

☐ **FIXED.** The errant “that” has been stricken.

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D.2 – Suggestion: Discussion of replacing the top layer could be placed in the context of the soil quality and depth BMP / revised Amend Soils minimum requirement.

□ **RECOMMEND NO FURTHER ACTION.**

We prefer to keep as written, which is quoted from SWMMWW, in case there is a query regarding how we incorporated MR#2, Element 1.

D.3 – Establish construction access does not have sufficient detail. The statement should include an indication of stabilizing entrances with quarry spalls, crushed rock, or other equivalent BMP. Also, the reference to cleaning roads promptly is too vague, and the method of cleaning needs to be specified. See Appendix 1 page 14.

□ **RECOMMEND NO FURTHER ACTION.**

The details for D.3 (and other codified minimum requirements) are in the Directors' Rule. For construction site access, see our Volume 2, which includes:

BMP E2.10 "Stabilized Construction Entrance"

BMP E2.15 "Tire Wash"

BMP E.220 "Construction Road Stabilization" and others.

We believe we are meeting the intent of Ecology's Minimum Requirement in Appendix 1, but are open to recommendations to tighten the provisions.

D.4 – says prior to "other" LDA; explain

□ **RECOMMEND NO FURTHER ACTION.**

The wording is borrowed from Appendix 1 (See, for example, MR#2, Element 4.b.), which requires sediment control BMPs to be functional "before other land disturbing activities take place." The intent is to meet the requirement in MR#2, Element 3.b for stormwater retention or detention facilities constructed as "one of the first steps in grading" and that the facilities "shall be functional prior to construction of site improvements." We're open to suggestions.

D6 – should include instructions concerning control of street washwater. According to Appendix 1 page14, street wash water must either be pumped back on the site, or otherwise prevented from discharging into systems tributary to waters of the state.

□ **FIXED.**

SMC 22.805.020.D.6 now reads:

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Prevent Erosion and Sediment Transport from the Site by Vehicles. Whenever construction vehicle access routes intersect paved roads, the transport of sediment onto the paved road shall be minimized. If sediment is transported onto a paved road surface, the roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed from paved roads by shoveling or sweeping and shall be transported to a controlled sediment disposal area. Street washing is allowed only after sediment is removed and street wash wastewater shall be prevented from entering the public drainage system or to a receiving water. ~~Street washing shall be allowed only after sediment is removed in this manner.~~

D7 – add this statement (from 5.d. on page 15 of Appendix 1) or an equivalent: Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

□ **FIXED.**

This section now reads:

7. Stabilize Soils. Prevent on-site erosion by stabilizing all exposed and unworked soils, including stock piles and earthen structures such as dams, dikes, and diversions. ~~that are temporarily exposed. Methods such as, but not limited to, the installation of seeding, mulching, matting, and covering may be specified by rules promulgated by the Director.~~ From October 1 to April 30, no soils shall remain ~~unstabilized~~ exposed and unworked for more than two days. From May 1 to September 30, no soils shall remain ~~unstabilized~~ exposed for more than seven days. Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast. Soil stockpiles shall be stabilized from erosion, protected with sediment trapping measures, and be located away from storm drain inlets, waterways, and drainage channels. Before the completion of the project, permanently stabilize all exposed soils that have been disturbed during construction. ~~Appropriate use of methods such as, but not limited to, vegetated buffer strips, storm drain inlet protection, silt fences, sediment traps, settling ponds, and protective berms may be specified in rules promulgated by the Director.~~

D.12 – typo. “that” should be removed. Why no list of dewatering disposal options (Ecy 10c)? Also, should include a statement prohibiting the routing of clean de-watering water through stormwater sediment ponds (Appendix 1 page 17).

□ **FIXED.**

The offending “that” has been removed.

□ **RECOMMEND NO FURTHER ACTION.**

We prefer not to codify the options listed by Ecology in Appendix 1 for dewatering (infiltration, onsite collection with offsite transportation and disposal, on-site chemical treatment, etc.), which broadly fall under the category of “...or other sediment removal BMP” wording in the Code. Sediment removal BMPs that are contained Section 4.3 of the Directors’ Rule (Volume 2) and include:

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BMP 4.3.50: Portable Sediment Tank
BMP 4.3.55: Construction Stormwater Chemical Treatment
BMP 4.3.60: Construction Stormwater Filtration
and others.

Also, our read of Ecology's statement referenced above (Appendix 1, Page 17) is that it is not a prohibition but, rather, a recommendation, "Clean de-watering water *should* not be routed through stormwater sediment ponds." Our preference is to keep recommendations in the Code to a minimum, relying in most instances on the discretion of our reviewers. .

D.15 – can a Construction Stormwater Control Plan also be a SWPPP? It should be submitted to DPD and reviewed when above the thresholds.

☐ **RECOMMEND NO FURTHER ACTION.**

No, Seattle's Construction Stormwater Control Plan and Ecology's SWPPP (per General NPDES Permit for Construction) have significant overlaps, but they are not the same. Seattle is responsible for reviewing and approving Construction Stormwater Control Plans that are submitted in accordance with our Stormwater Code and Directors' Rules. Ecology retains responsibility for reviewing and approving SWPPPs submitted per NPDES permits.

General D comment – need to indicate that all elements are required unless you document that an element is not applicable. Possibly include this information in 22.807.020.B1b and B2d, etc.?

☐ **CITY/ECOLOGY NEED TO DISCUSS.**

In light of your comment, and the similar comment regarding Volume II (Construction Site Stormwater Pollution Prevention Manual), our intention is to develop a checklist that contains all elements and require our small projects (i.e., those with ≥ 750 square feet of land disturbing activity but $< 5,000 \text{ ft}^2$ of new plus replaced impervious surface) to explicitly indicate which of our 17 elements do not apply.

Section D has been rewritten as follows:

D. Minimum Requirements for Construction Site Stormwater Pollution Prevention Control. ~~During land disturbing activities or addition or replacement of impervious surface,~~ Temporary and permanent construction controls shall be used to accomplish the following (a–g) minimum requirements. ~~Rules promulgated jointly by the Directors of SPU and DPDDCLU specify the minimum required controls as well as~~ All projects are required to meet each of the elements indicated below or document why an element is not applicable. Additional controls ~~that~~ may be required by the Directors ~~of SPU or DPDDCLU~~ when minimum controls are not sufficient to prevent erosion or transport of sediment or other pollutants from the site.

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Amend Soils

22.805.020.E – This appears to be the only place where Seattle addresses the soil quality and depth BMP (BMP T5.13). However, the requirement to amend soils is too vague. Seattle must indicate some minimum specifications such as 10% organic content for landscaping and 5% for turf to a depth of 8 inches. The soil quality and depth BMP is typically considered under MR#5 (Appendix 1 page 19).

□ CITY/ECOLOGY NEED TO DISCUSS.

We believe we have addressed the soil amendment requirements sufficiently in the Directors' Rule (Volume 3), but would consider adding more in the Code if Ecology believes it critical. Our concern with codifying design parameters, particularly with respect to Green Stormwater Infrastructure, is the fact that the state-of-the-practice is continuing to expand and changes in criteria continue to occur. In Volume 3 there is a section titled, "Post Construction Soil Quality and Depth." This section includes two cross-section figures showing planting bed soil amendment and turf soil amendment features. In the sub-section of "Design Guidelines and Requirements, one can find minimum specifications (e.g., minimum organic matter content, pH range, minimum depth, and compost quality). We also reference Ecology's BMP T5.13.

Green Infrastructure BMPs

22.805.020.F – This appears to be the primary place where MR#5 Onsite Stormwater Management is invoked. The City's requirement, however, appears to exclude all projects other than SFR and those that trigger flow control and treatment (i.e., it excludes smaller parcel, roadway, and joint roadway parcel projects). This is not consistent with Appendix 1 of the permit. MR#5 is required for all project types at the 2,000 sf/7,000 sf LDA threshold. Also, clarify whether the soil quality and depth BMP is considered to be a Green Infrastructure BMP; current code structure implies it is not.

□ CITY/ECOLOGY NEED TO DISCUSS.

At our meeting on 5/14 with Ecology, we reviewed Ecology's comments on this of minimum requirements. The meeting results are summarized below. We believe Ecology and the City have reached agreement, but want to confirm.

1. Seattle's green infrastructure BMP requirement, when coupled with the requirement to amend all soils, is intended to meet or exceed equivalency with MR#5 because: (1) Seattle's soil amendment requirement is triggered for all projects, regardless of size, whereas Ecology's is triggered generally at 2,000 ft² or more of new plus replaced impervious surface; (2) Seattle's green stormwater infrastructure requirement is triggered for all SFRs, regardless of size, whereas Ecology's is triggered generally for SFRs having 2,000 ft² or more of new plus replaced impervious surface; (3) the set of facilities that are considered under Seattle's green infrastructure is broader than those BMPs specifically contained in MR#5.

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2. It is incorrect to read 22.805.020.F to exclude all but SFRs from green stormwater infrastructure. As written, in addition to all SFRs (regardless of size), *all projects* with 2,000 ft² or more of new plus replaced impervious surface are required to implement green infrastructure to the maximum extent feasible. Finally, all projects triggering requirements for flow control or treatment are required to use green stormwater infrastructure to the maximum extent feasible to meet the requirement. With respect to equivalency, Seattle's flow control and treatment thresholds match or exceed Ecology's for MR#5.
3. It is true that there is a potential gap in equivalency for a project located in Seattle with more than 7,000 square feet of land disturbing activity but resulting in less than 2,000 square feet of new plus replaced impervious surface. However unlikely this is to occur, we have added verbiage to address this possibility. SMC 22.805.020.F now reads as follows:

F. Implement Green Stormwater Infrastructure BMPs. All Single-family residential projects, ~~must implement green infrastructure technologies to infiltrate, disperse, and retain drainage water onsite to the maximum extent feasible without causing flooding, landslide, or erosion impacts.~~ all other projects with 7,000 square feet or more of land disturbing activity, and all projects with 2,000 square feet or more of new plus replaced impervious surface. All other projects required to comply with subsection 22.805.080 (Minimum Requirements for Flow Control) and or subsection 22.805.090 (Minimum Requirements for Treatment) below must implement green stormwater infrastructure technologies to infiltrate, disperse, and retain drainage water onsite to the maximum extent feasible without causing flooding, landslide, or erosion impacts.

Wetlands

22.805.020.G – Regarding the protection of wetlands, where is the equivalent of Ecology's Guidesheets 1B and 2B in Seattle's proposal? We could not locate this information.

□ **FIXED.**

We have added a reference in our Volume 3 to Ecology's Guidesheets (located in Appendix 1-D of Volume 1 of *The Stormwater Management Manual for Western Washington*).

Source Controls

22.805.020.J – This section should also reference Seattle's Vol. 1 Source Control manual for additional structural BMPs required for specific activities and/or land uses.

□ **RECOMMEND NO FURTHER ACTION.**

We prefer to keep as written, which specifically focuses on applying requirements to install structural source control BMPs in conjunction with a project. Direct reference

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to the Source Control Directors’ Rule are in SMC 22.803.030 and SMC 22.803.040, which more broadly apply to all real property and all pollution-generating activities..

Off-site Analysis

22.805.020.K – Discuss how this works in the context of the other minimum requirements for all projects.

□ **RECOMMEND NO FURTHER ACTION.**

Upon further review, we do not believe this is an equivalency issue and this section has been deleted in its entirety.

Maintenance Standards

22.805.080.B.5 and 22.805.090.B.7 refer to an Inspection and Maintenance Schedule “submitted to the Director.” The Permit requires that the City establish maintenance standards by 8/16/08. These SMC sections should refer to those maintenance standards, instead of allowing each project to propose their own inspection and maintenance schedule.

□ **FIXED.**

SMC 22.805.080.B.5 and SMC 22.805.090.B.7 (now 22.805.090.B.10) now read:

5. 6. Inspection and Maintenance Schedule. Temporary and permanent flow drainage control ~~and stormwater treatment facilities and other controls~~ shall be inspected and maintained according to a schedule submitted to rules promulgated by the Director in order for these facilities to be kept in continuous working order. ~~The schedule shall meet the requirements of this subtitle.~~
- 7.10. Inspection and Maintenance Schedule. Temporary and permanent flow drainage control ~~and stormwater treatment facilities and other controls~~ shall be inspected and maintained according to a schedule submitted to rules promulgated by the Director in order for these facilities to be kept in continuous working order. ~~The schedule shall meet the requirements of this subtitle.~~

Flow Control – General

Ecology has numerous questions and concerns regarding Seattle’s application of flow control requirements to different project types and the associated use of Green Infrastructure BMPs as both the MR#5 On-site Stormwater BMP menu and MR#7 Flow Control. We need to discuss this concept in order to refine our comments. Below are our initial thoughts on this topic:

□ **CITY/ECOLOGY NEED TO DISCUSS.**

At our meeting on 5/14 with Ecology, we reviewed Ecology’s comments regarding flow control. The meeting results are summarized below. We believe Ecology and the City have reached agreement, but want to confirm.

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- Review and discuss Enclosure 1, Table 2. Does this apply only to SMC 22.805.080 (e.g. MR#7 Flow Control)? If so, the text in each box in the SFR row (except the “designated receiving water not to capacity constrained system”) is misleading and should instead read “not required.” This is an example of where there are blurred lines between MR#5 and MR#7.

□ **FIXED.**

To clarify the requirements for Single-family Residential Projects (SFRs), 22.805.020.F (Implement Green Stormwater Infrastructure) has been revised. It now reads:

F. Implement Green Stormwater Infrastructure ~~BMPs~~. All Single-family residential projects, ~~must implement green infrastructure technologies to infiltrate, disperse, and retain drainage water onsite to the maximum extent feasible without causing flooding, landslide, or erosion impacts. all other projects with 7,000 square feet or more of land disturbing activity, and all projects with 2,000 square feet or more of new plus replaced impervious surface. All other projects required to comply with subsection 22.805.080 (Minimum Requirements for Flow Control) and or subsection 22.805.090 (Minimum Requirements for Treatment)~~ below must implement green stormwater infrastructure technologies to infiltrate, disperse, and retain drainage water onsite to the maximum extent feasible without causing flooding, landslide, or erosion impacts.

Note that SMC 22.805.030.A (which required all SFRs to implement green stormwater infrastructure to the maximum extent feasible) has been deleted as redundant.

- Our assessment of Seattle’s proposal is that the requirement to apply MR#5 to all projects at the 2,000 sf/7,000 sf LDA threshold would, with some revisions, be addressed by SMC 22.805.020.E (Amend Soils) and F (Green Infrastructure BMPs). Is this how Seattle envisions its response to the MR#5 requirement?

□ **FIXED.**

We have added a 2,000 ft² – 7,000 ft² land disturbing activity (LDA) threshold triggering our green stormwater infrastructure requirement. This level of LDA will already, as Ecology noted, require soils to be amended. The revised 22.805.020.F. is quoted above.

- Relationship between MR#5 On-site Stormwater Management BMPs and MR#7 Flow Control – Seattle’s proposal appears to blur the distinction between MR#5 and MR#7. In order to evaluate equivalency, we need to be sure we understand the proposal from the perspectives of MR#5 and MR#7.

□ **RECOMMEND NO FURTHER ACTION.**

Our understanding from the 5/14 meeting with Ecology is that Seattle’s minimum requirements for green stormwater infrastructure and soil amendments satisfy equivalency considerations with Ecology’s MR#5. Owing

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to citywide concerns with flooding & erosion if roof downspout controls are not prescriptively incorporated into the Code, but will be evaluated programmatically on a basin or sub-basin approach.

- SFR projects: Seattle's Green Infrastructure BMP requirement for SFR, coupled with the revised Amend Soils requirement, is potentially equivalent to Appendix 1 MR#5. Seattle does not propose to require Flow Control for any SFR project because a SFR project is defined to be less than 10,000 sf impervious and less than 5,000 sf PGIS.

□ **RECOMMEND NO FURTHER ACTION.**

Our understanding from the 5/14 meeting with Ecology is that Seattle's SFR project requirements are equivalent to Appendix 1. Our Stormwater Code will require green stormwater infrastructure and soil amendments, but not a underground flow control facility, which could be required by Ecology's MR#7 for an SFR project having $\geq 10,000$ ft².

- Roadway Projects: With the exception of the soil quality and depth BMP (a revised Amend Soils), Seattle does not propose requiring MR#5. Since Ecology's MR#5 BMP menu was designed to address the type of impervious area configurations you would find on a building project, Seattle's proposal is potentially equivalent.

□ **RECOMMEND NO FURTHER ACTION.**

Our understanding from the 5/14 meeting with Ecology is that Seattle's Roadway project requirements are equivalent to Appendix 1.

- Parcel based projects: With the exception of the soil quality and depth BMP (a revised Amend Soils), Seattle does not propose requiring MR#5.
 - For flow-critical receiving waters (and capacity constrained conveyance systems), Seattle's MR#7 Flow Control is triggered at 2,000 sf new plus replaced impervious surface, which is lower than Ecology's MR#7 threshold. Green Infrastructure BMPs are then required to be used as feasible to help meet Flow Control requirements.

□ **RECOMMEND NO FURTHER ACTION.**

Our understanding from the 5/14 meeting with Ecology is that Seattle's Parcel-based project requirements for implementing green stormwater infrastructure and amending all disturbed soils are equivalent to Appendix 1.

- For flow-critical receiving waters (and capacity constrained conveyance systems), Seattle's MR#7 is triggered at $\frac{3}{4}$ acres and 2.5 acres of the conversion types, consistent with Ecology's MR#7 threshold. Seattle's MR#7 is also triggered if a 0.1 cfs increase is projected. If the conversion is less than $\frac{3}{4}$ or 2.5 acres, and greater than or equal to 7,000 sf LDA (but does not indicate a 0.1 cfs increase), then Seattle's proposal misses the

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MR#5 requirement (except revised Amend Soils) for parcel based projects. What kinds of projects would we expect to fall into this – parks and rec, small commercial projects? Would impacts from these projects be sufficiently managed through the soil quality and depth BMP?

□ **RECOMMEND NO FURTHER ACTION.**

We can add an additional threshold if needed, but believe there are very few projects that occur in Seattle that involve over 7,000 ft² of land disturbing activity (LDA), but result in less than 2,000 ft² of new or replaced impervious surface (Seattle's threshold for flow control), which is the gap in question.

- MR#7 is not triggered for discharges to designated receiving waters (where the conveyance system is not “capacity constrained”). Thus, per Seattle's proposal, in these situations, parcel projects are not required to implement MR#5, except revised Amend Soils. This is not consistent with Appendix 1. Green infrastructure BMPs, where feasible, will still play a role in minimizing impacts to designated receiving water bodies.

□ **FIXED.**

22.805.020.F (Implement Green Stormwater Infrastructure) has been revised. See above (two pages back) for excerpted text.

- SMC 22.805.020.F states that Green Infrastructure BMPs are required for other project types when they trigger flow control and treatment. This is internally inconsistent (080.B.1 which is part of Flow Control requires green infrastructure irrespective of the treatment MR).

□ **FIXED.**

See preceding comment.

- Sidewalk/Trail Projects: Seattle's proposal requires MR#5 when discharging to flow-critical receiving waters (and capacity constrained conveyance systems), but exempts these projects from MR#7, irrespective of impervious area.

□ **RECOMMEND NO FURTHER ACTION.**

Ecology's appraisal is correct. Seattle's assessment is that the costs to meet Ecology's MR#7 flow control requirement (which requires a flow control facility at $\geq 10,000$ ft²) would be disproportionate to the cost of the sidewalk project itself, particularly in light of the expenses to collect and convey flows from long, linear, narrow paved surface into a detention system. The same holds true for trail projects.

- Because Seattle proposes to *not* use the concepts of “effective impervious surface” and “threshold discharge area,” the application of project MR#7 thresholds to sidewalk/trail projects could result in more of these projects needing flow control than required by Appendix 1. Effectively, Seattle is requesting a jurisdiction-wide exception for sidewalk/trail projects from

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MR#7. Ecology will need to understand Seattle's rationale before deciding whether to approve this jurisdiction-wide exception.

□ **RECOMMEND NO FURTHER ACTION.**

We provided our rationale at the 5/14 meeting with Ecology and believe we reached consensus on approval for the City's proposed requirement, which we believe will provide more flow control benefits than Ecology's minimum requirement. In summary, our assessment is that it is highly unlikely for a trail or sidewalk project in the City of Seattle to have a threshold discharge area over 10,000 ft², hence, we focused on using green stormwater infrastructure to the maximum extent feasible, beginning at a much lower threshold ($\geq 2,000$ ft²). We believe that incorporating green stormwater infrastructure for more, but smaller trail/sidewalk projects is a preferred approach.

- In this scenario, MR#5 (except revised Amend Soils) is not triggered for discharges to designated receiving waters (and where the conveyance system is not "capacity constrained"). Since Ecology's MR#5 BMP menu was designed to address the type of impervious area configurations you would find on a building project, Seattle's proposal is potentially equivalent.

□ **FIXED.**

Ecology appears to imply that their MR#5 was intended to target building projects. We disagree in that we believe MR#5, as embodied by both our green stormwater infrastructure and amend soil requirements, should apply to *all* projects independent of the receiving water into which the project discharges. 22.805.020.F (Implement Green Stormwater Infrastructure) has been revised. See above (three pages back) for excerpted text. We are now proceeding to develop tools for implementing an MEF-based standard for projects in the City.

- Joint Projects: Seattle's proposal is to trigger on-site stormwater management BMP/flow control and treatment requirements separately for the parcel-based and roadway portions of joint projects. We need to discuss this approach in light of the above comments.

□ **RECOMMEND NO FURTHER ACTION.**

We discussed this at the 5/14 meeting with Ecology and believe we reached consensus on approval for the City's proposed requirement. Seattle proposes to use the public right-of-way line as the basis for evaluating thresholds for flow control and treatment for joint projects in order to consistently and fairly implement the regulations, which distinguish – as incorporated into Ecology's minimum requirements – between "road-related projects" and all other projects.

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- Seattle is using a smaller 2,000 sf of new plus replaced impervious to trigger on-site stormwater management BMPs/flow control requirements than Ecology's trigger for flow control. Is it Seattle's expectation that flow control standards for these small surface areas will be met by using Green Infrastructure (as modeled in WWHM)? Vaults and orifice size do not achieve flow control standards at these smaller impervious areas.

□ **RECOMMEND NO FURTHER ACTION.**

We discussed this at the 5/14 meeting with Ecology. Ideally, flow control performance standards for the smaller projects (and, we hope, for many of the larger projects) will be met with green stormwater infrastructure. When an orifice-based flow control facility must be constructed, our technical requirements will establish a minimum orifice diameter of 0.50" which, although not fully meeting the performance standard, will still provide some flow control benefit.

- 22.805.020.F – Implement Green Infrastructure BMPs is listed as a MR for all projects, but is actually proposed to be only applicable to SFR (reflected in 22.805.030.A) and projects requiring Flow Control (reflected in 22.805.080.B.1) and Treatment (somewhat reflected in 22.805.090.B.6).

□ **RECOMMEND NO FURTHER ACTION.**

We discussed this at the 5/14 meeting with Ecology. Seattle's green stormwater infrastructure requirement applies to all projects. See rewritten excerpt above (about three pages preceding).

- Clarify receiving water issue relative to the concept of direct discharge vs. discharge via MS4:

□ **RECOMMEND NO FURTHER ACTION.**

We discussed all the below comments at the 5/14 meeting with Ecology and believe we reached consensus on approval for the City's proposed requirement. While the City's NDPES Municipal Stormwater Discharge Permit applies to City-owned/operated municipal separate storm sewer systems, our Stormwater Code has a broader scope, applying also to discharges into the City's combined sewer system and discharges from privately-owned systems that go directly into receiving waters.

- discharges to "designated receiving water" – applies to direct discharges AND discharges to not capacity constrained MS4 → designated receiving water

□ **RECOMMEND NO FURTHER ACTION.**

See preceding comment.

- discharges to "flow critical receiving water" – applies to direct discharges to watercourses AND to MS4 → watercourse.

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□ RECOMMEND NO FURTHER ACTION.

See preceding comment.

- Are all watercourses flow critical receiving waters?

□ RECOMMEND NO FURTHER ACTION.

No. For example, a ditch/culvert would be a watercourse, but not a flow-critical receiving water. [Note, however, that a ditch/culvert system is typically considered capacity constrained for flow control purposes.]

- What are you doing for the partially separated areas?

□ RECOMMEND NO FURTHER ACTION.

In a partially separated area, the minimum requirements are site-specific, as some sites will discharge into the combined sewer system, and others into the MS4.

Flow Control – Analysis of Thresholds and Performance Standards for Parcel Based Project in Creek Basins (Encl 6)

The Seattle proposal as a whole is not acceptable (see bullets below). There are elements of it that are acceptable depending upon % TIA of the basin and whether the project is new development or redevelopment. Because Seattle does not want to distinguish between new and redevelopment, potential solutions are more difficult to identify. Appendix 1 does not provide for deviations where new development projects exceed the thresholds; Appendix 1 does provide for deviations from the standard redevelopment requirement where there is a commensurate or greater benefit with another approach.

- For basins with less than 40% TIA:
 - New development projects with $\geq 10,000$ sq. ft. effective impervious in a TDA must use the Ecology standard (forested; $\frac{1}{2}$ the 2-year through the 50-year).

□ CITY/ECOLOGY NEED TO DISCUSS.

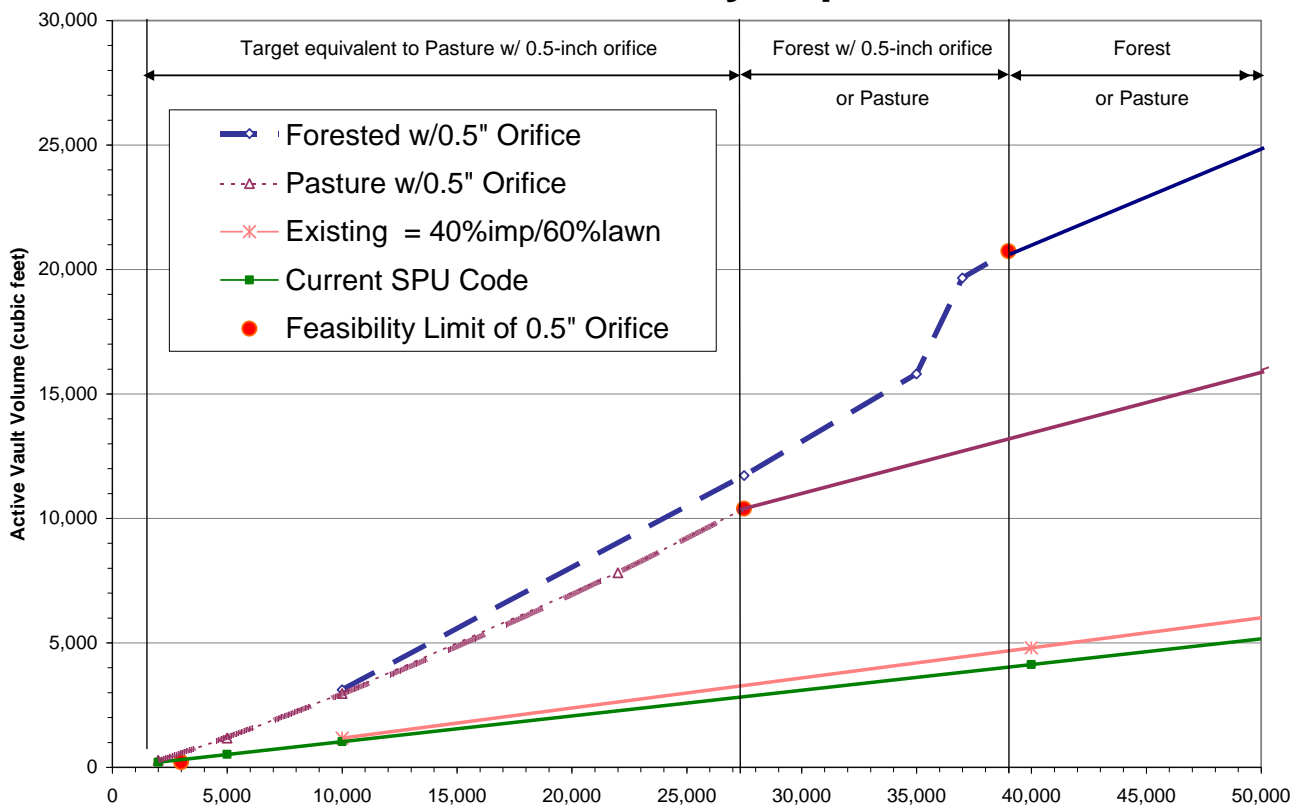
We can rewrite Seattle's minimum requirements such that the post-development performance standards is based on a pre-Columbian forested condition for all new development projects $\geq 10,000$ ft² for projects located in basins with less than 40% historic total impervious area (TIA). However, by extensive modeling we have determined that a forested standard cannot be achieved until the contributing impervious surface area is approximately 39,000 ft² owing to a minimum orifice size limitation of 0.5". Our own, proposed pasture condition cannot be fully achieved until there are approximately 27,500 ft² of effective impervious surface area discharging into the flow control facility (see the figure provided on the next page). Based on the assumptions used in our modeling, the active vault volumes for the two

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performance standards are similar until approximately 27,500 ft² with a more pronounced divergence beginning to appear at approximately 35,000 ft² (see figure below).

Our recommendation is to use a consistent performance standard based on a pasture land condition for all projects (both new development and redevelopment) beginning at 2,000 ft² of new plus replaced impervious surface (in contrast to Ecology's 10,000 ft² threshold) until a project exceeds 35,000 ft², at which point the Ecology's forested standard would be imposed.

Detention Vault Volume by Impervious Area



- New development and redevelopment projects with > 2,000 sq. ft. but < 10,000 sq. ft. of effective new and replaced impervious surface in a TDA may use the Seattle standard

□ RECOMMEND NO FURTHER ACTION.

We will use our standard for projects below 10,000 ft². See comment above for projects over 10,000 ft².

- Redevelopment projects exceeding 10,000 sq. ft. of effective new and flow-eligible replaced impervious surface in a TDA must meet the Ecology standard (with the option of using pasture in projects up to 27,000 sq. ft. because of the

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limitations caused by 0.5-inch orifice limitation), UNLESS Seattle can demonstrate that the number of projects and the flow benefits of meeting the Seattle standard (2,000 sq. ft. thresholds, pasture conditions and matching peaks and durations from ½ the 2-year to the 2-year) outweigh the benefits of the Ecology standard. Seattle may have demonstrated better than equivalency for redevelopment projects in Enclosure #6. However, because Seattle excludes single family residences from flow control, the enclosure's analysis needs to be reinterpreted to compare detention volumes, flow rates, and durations.

□ CITY/ECOLOGY NEED TO DISCUSS.

Note: Contrary to Ecology's original assessment and as discussed during our 5/14 meeting, Seattle's proposed requirements do not exclude single-family residential projects from flow control, but rather require these projects, not matter their size, to use green stormwater infrastructure to the maximum extent feasible. We removed the requirement to prescriptively meet flow control performance standards for SFR projects using underground detention owing the risks posed to individuals unfamiliar with confined space entry during maintenance. See discussions earlier in this document regarding our intentions with green stormwater infrastructure and SFR projects.

Additional discussion follows.

Enclosure #6, which compares and contrasts Ecology's and Seattle's flow control performance standards and thresholds, assumes 58 SFR projects per year will be $\geq 2,000 \text{ ft}^2$, thereby triggering our requirement for flow control. Since Enclosure #6 was prepared, Seattle has revised its requirements for SFR projects such that *all* projects, no matter their size, will be required to implement green stormwater infrastructure (GSI) to the maximum extent feasible (MEF). These projects will not be required to install an underground flow control facility should GSI/MEF not be sufficient above-ground to meet the pasture-based performance standard.

The original analysis that is summarized in Enclosure #6 assumed the flow control requirement was met by all projects using buried corrugated metal pipe (CMP) for detention 60% of the time and above-ground bioretention facilities 40% of the time. Despite both an investigative and programmatic interest in doing so, we believe that there are too many uncertainties in implementation of a GSI/MEF requirement for us to quantitatively revisit the analysis done for Enclosure #6. The degree to which the 60% CMP-based detention facilities would be able to meet the flow control performance standard using GSI/MEF alone is not well understood and the subject of much continuing discussion among various internal and external stakeholders in our revision process. Additionally, the contribution of

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SFR projects that are < 2,000 ft² toward reducing flows in creek basins (which will now be affected by the new GSI/MEF requirement) is not known, although it is certain to provide some measure of benefit. Finally, note that in order to perform the analysis on relative costs and benefits in Enclosure #6, we had to normalize the thresholds, lowering Ecology's from 10,000 ft² to 2,000 ft². Analytical needs notwithstanding, it is clear to us that, given Seattle's development patterns, Ecology's 10,000 ft² threshold would impact far fewer projects – and virtually no SFR projects. This again points to Seattle's thresholds as the preferred approach.

Our overall assessment is that we believe our proposed 2,000 ft² threshold and peak/duration standard for pasture condition for all parcel-based projects *and* our proposed 2,000 ft² threshold and peak/duration standard for pasture condition for roadway projects (which would not otherwise trigger flow control per Ecology's minimum requirements), *and* our revised minimum requirements for *all* single family residential (SFR) projects independent of the size (which would not otherwise trigger flow control per Ecology's minimum requirements), will provide equal or better benefits with regard to flow control in creek basins than Ecology's standard.

Our recommendation is that we be allowed to retain our thresholds and performance standards for redevelopment projects that exceed 10,000 ft² of new plus replaced impervious surface.

- For basins with more than 40% TIA:
 - The Seattle proposal is acceptable for all new development projects < 10,000 sq. ft. but > 2,000 sq. ft. effective impervious area.

□ **RECOMMEND NO FURTHER ACTION.**

We will use our standard for projects between 2,000 ft² and 10,000 ft².

- For new development projects, use the Ecology standard (existing; ½ the 2-year through the 50-year) where the existing condition is forested and the site will exceed 10,000 sq. ft. effective impervious surface in a TDA. Where the site does not exceed 10,000 sq. ft. effective impervious surface in a TDA, the Seattle standard is acceptable.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

For new development projects where the existing condition is forested, we would propose a threshold of 35,000 ft² per our discussion above for basins with over 40% TIA.

- For new development projects, use the Ecology standard (existing condition; ½ the 2-year to the 50-year) where the land cover is pasture or grass and the site has

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10,000 sq. ft. or more of effective impervious area in a TDA. Where the site does not exceed 10,000 sq. ft. effective impervious surface in a TDA, the Seattle standard is acceptable.

□ CITY/ECOLOGY NEED TO DISCUSS.

We highly recommend that Seattle retain its post-development pasture-based flow control performance standard for all new development projects except when the existing site condition is forested and the size of the project exceeds 35,000 square feet of new plus replaced impervious surface (see discussions above). We believe our performance standard based pasture and 1/2 the 2-year to the full 2-year is more protective of creeks than a standard based on “grass”. We would also strongly prefer to avoid trying to define what is meant by “pasture” as an existing land cover in the context of Seattle’s current landscape.

- The Seattle proposal is acceptable for all redevelopment projects $\geq 2,000$ sq. ft. The assumption is that the benefit of reducing flows from replaced impervious surfaces (down to 2,000 sq. ft.) to a pasture level through the 2-year flood frequency (under the ECY standard, these surfaces would not be subject to any flow reduction) will more than offset the loss of reduction caused by controlling new impervious surfaces (that exceed 10,000 sq. ft. in a TDA) to pasture (through the 2-year flow) instead of forest (through the 50-year flow). Note that under the Ecology standard, new impervious surfaces at redevelopment sites are controlled only to the exiting condition. If the existing condition is grass, there probably is a similar flow reduction in controlling that surface to pasture through the 2 year flow rather than controlling it to grass through the 50-year. In addition, there probably aren’t many redevelopment projects where the existing land cover is forested. So it is unlikely that we are missing a benefit in that situation.

□ RECOMMEND NO FURTHER ACTION.

We will use our standard for projects $\geq 2,000$ ft².

Our proposed set of thresholds and performance standards for creeks is now drafted as follows:

- 3. For discharges into creek drainage basins, the post-development discharges shall match discharge peak flow rates and flow durations of a pre-developed condition to the extent allowed by law, and at a minimum shall maintain existing peak flow rates and flow durations as follows.
 - a. For discharges into the following creek drainage basins: Blue Ridge Creek, Broadview Creek, Discovery Park Creek, Durham Creek, Frink Creek, Golden Gardens Creek, Kiwanis Ravine/Wolfe Creek, Licten Springs Creek, Madrona Park Creek, Mee-Kwa-Mooks Creek, Mount Baker Park Creek, Puget Creek, Riverview Creek, Schmitz Creek, Taylor Creek, and Washington Park Creek.

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(1)	<u>If the total new plus replaced impervious surface is 35,000 square feet or more, the post-development discharge peak flow rates and flow durations must be matched to the pre-developed <i>forested condition</i> for the range of pre-developed discharge rates from 50% of the 2-year recurrence interval flow up to the 50-year recurrence interval flow.</u>
(2)	<u>If the total new plus replaced impervious surface is less than 35,000 square feet, the post-development discharge peak flow rates and flow durations must be matched to the pre-developed <i>pasture condition</i> for the range of pre-developed discharge rates from 50% of the 2-year recurrence interval flow up to the 2-year recurrence interval flow.</u>
b.	<u>For discharges into all other creek drainage basins:</u>
(1)	<u>If the existing site condition is forest and the total new plus replaced impervious surface is 35,000 square feet or more, the post-development discharge peak flow rates and flow durations must be matched to the pre-developed <i>forested condition</i> for the range of pre-developed discharge rates from 50% of the 2-year recurrence interval flow up to the 50-year recurrence interval flow.</u>
(2)	<u>For all other site conditions or if the total new plus replaces impervious surface is less than 35,000 square feet, the post-development discharge peak flow rates and flow durations must be matched to the pre-developed <i>pasture condition</i> for the range of pre-developed discharge rates from 50% of the 2-year recurrence interval flow up to the 2-year recurrence interval flow.</u>

Flow Control – Estimated Impervious Area of Seattle Creek Basins (Encl 7)

Seattle has relied on the argument that because almost all of their basins showed no change in impervious area from 1991 through 2001 (as estimated by the Sanborn analysis), that those same basins had no change from 1985 to 1991. This is not a supportable conclusion. Seattle's argument is based upon using generic TIA's for different land use categories. Firstly, Seattle provides no basis for the estimates used for those categories. Secondly, a citywide comparison basis is used to criticize the Sanborn estimates. There isn't an acknowledgement that the city's generic averages may not work well in an individual basin. The Sanborn estimates are at least taken from actual images rather than desktop assumptions. A review of a city street map and satellite images from Google Maps for each of the basins listed above provides some visual indication of the reasons for the reduced impervious areas of these larger basins as compared to other larger basins (such as Thornton, Pipers, and Longfellow).

□ **FIXED.**

As discussed at the 5/14 meeting and subsequently regarding Ecology's comments above and below, we have added Blue Ridge, Broadview, Durham, Puget, and Taylor Creeks to our list of creeks requiring the higher level of flow control. This list now includes:

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Blue Ridge Creek, Broadview Creek, Discovery Park Creek, Durham Creek, Frink Creek, Golden Gardens Creek, Kiwanis Ravine/Wolfe Creek, Lichten Springs Creek, Madrona Park Creek, Mee-Kwa-Mooks Creek, Mount Baker Park Creek, Puget Creek, Riverview Creek, Schmitz Creek, Taylor Creek, and Washington Park Creek.

Seattle needs to provide basin-specific analyses to support TIA estimates for 1985. Example analyses include:

- Compare aerial photographs from 1985 or earlier with photographs from anytime after 1991.
- Report building permits for the '85 to '91 time frame for each drainage basin.

Assuming that Seattle can provide adequate and basin-specific justifications to make judgments based on the '91 data, the following comments apply:

Seattle's impervious area estimates for Blue Ridge, Broadview, Durham, Puget, and Taylor creeks are significantly different than the Sanborn estimates. Here are some gross observations to start the discussion based upon approximately locating these basins on city street maps and Google Maps.

Blue Ridge Creek System: These appear to be four separate small drainages that should be evaluated separately rather than cumulatively. Because these are small, narrow basins, the land occupied by the steep, undeveloped drainage channels can have a significant impact on the overall TIA. Here are the Sanborn estimates for each as identified by a basin # assigned by Sanborn:

Basin	Acreage	TIA estimates (91/96/01)
1189	85	32/32/32
1190	50	40/40/40
1191	65	32/32/32
2170	41	23/23/23

Broadview Creek: This also appears to be two separate drainages that should not be combined into one TIA average. The northern basin (2163) seems to have a very light street footprint suggesting a lesser intensity of development in an area of varied topography. Images on Google Earth of this basin and Basin 1187 show areas with significant vegetation as compared to the average residential development in the City. The estimates by Sanborn are:

Basin	Acreage	TIA estimates (91/96/01)
1187	125	24/24/24

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2163

92.5

4/4/4

Durham Creek: This is a small drainage next to 509. Google seems to show that it is dominated by a rather large undeveloped area just south of a Park 'N Ride. This explains the low TIA in an area otherwise classified as industrial.

Puget Creek: This drainage includes Puget Park and a good portion of the wooded hillside facing east toward the Duwamish. Its TIA is going to be lower than average.

Taylor Creek: This drainage includes a significant amount of undeveloped land: Lakeridge Park and an undeveloped area to the west of the north/south park area.

Lots in this area may be larger than the Seattle average too. The Seattle and Ecology estimates of TIA in this basin have the smallest difference as compared to the other contested basins. So, there isn't a reason to dismiss the Ecology estimates or to think that they have less foundation than Seattle's estimates.

Additionally, Figure 1 in the enclosure does not include the City limits. Any basin that is not entirely within the City of Seattle's jurisdiction for which Seattle is proposing an alternate TIA (and thus flow control standard) needs concurrence and support from these other jurisdictions. Based on a simple map comparison, this comment potentially applies to Seola Beach, Durham and Taylor.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

The City is proposing alternative – and more protective – flow control standards to Ecology's minimum requirements for most of our creek systems. For those flow-critical receiving waters that span two or more jurisdictions, does Ecology prefer that Seattle not take our proposed Code through the City's legislative process until we have reached agreement with the other jurisdictions? This could potentially include: City of Shoreline (Broadview & Thornton Creeks), Lake Forest Park (Thornton Creek), Burien (Seola Beach Creek), and King County (Taylor Creek). It is unclear how Seattle should proceed if one or more of these jurisdictions chose to use Ecology's less-protective set of thresholds and performance standards.

Also, note that the creek list in 22.805.080B.3.a. is not consistent with the tables in Encl. 7. We are assuming that the Enclosure reflects Seattle's official proposal.

□ **FIXED.**

Enclosure 7 was intended reflect our official proposal. Changes have been made to the draft Stormwater Code, which now reflects the list provided in the boxed text above.

22.805.080 – Flow Control

Changes to this draft code language will be necessary based on Ecology comments on the flow control-related enclosures.

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How does Seattle intend to interpret B.2 regarding wetlands?

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We believe we have addressed Ecology's query by modifying SMC 22.805.080 (Minimum Requirements for Flow Control), subsection B.2. as follows (note the change added regarding protecting functions & values per the state's Growth Management Act):

2. For discharges into wetlands, the post-development discharge shall maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics of the wetland necessary to protect the functions and values of wetlands, per subsection 22.805.020.G (Protect Wetlands).

Treatment

22.805.060 Minimum Requirements for Joint Roadway and Parcel-Based Projects –Subsections A.4 and C.2 are not consistent with Appendix 1 because they apply the 5,000 sq. ft. PGIS threshold for triggering treatment separately to both aspects of the project. In other words, a project may have just under 5,000 sq. ft. of PGIS in the road, and just under 5,000 sq. ft. of PGIS in the parcel, and not trigger treatment. The threshold must be 5,000 sq. ft. total for the project, regardless of how it is distributed between the parcel and the road. Effectively, Seattle is requesting a jurisdiction-wide exception for joint projects from MR#6. Ecology will need to understand Seattle's rationale before deciding whether to approve this jurisdiction-wide exception.

□ **RECOMMEND NO FURTHER ACTION.**

We discussed this at the 5/14 meeting with Ecology and believe we reached consensus on approval for the City's proposed requirement. As discussed above within the context of flow control, Seattle proposes to use the public right-of-way line as the basis for evaluating thresholds for flow control and treatment for joint projects in order to consistently and fairly implement the regulations. Among the reasons for selecting the public right-of-way line of demarcation was the assessment that *typically*, it is at or near this line where a flow boundary condition occurs. That is, runoff flows on the private side of the public right-of-way line are typically managed by the property owner/operator, whereas runoff flows on the public side of the right-of-way line typically are managed by drainage control systems owned and operated by the City. Additionally, Seattle believes that because our threshold triggering stormwater treatment for roadway projects ($\geq 2,000 \text{ ft}^2$) is far more protective than Ecology's (a project must add $\geq 50\%$ to the existing impervious roadway surface before triggering), more treatment facilities will be constructed. This, we suggest, should further justify Seattle's proposal.

22.805.090 – Based on draft SMC, it is not clear how Seattle proposes to use the concept of "basic treatment." There is no mention in Section B. of when Basic Treatment is a requirement. It should be required for single family projects, and all parcel-based residential (i.e., multiple residences, subdivisions) projects. It should also be required for all road projects, not meeting

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the criteria in B.4.b., that exceed 5,000 sq. ft. of new and, in some instances, replaced PGIS in a threshold discharge area. The replaced PGIS is subject to treatment if the new impervious (PGIS and non-PGIS) areas are 50% or more of the existing impervious area within the project limits. Basic treatment is also required for any projects discharging directly or indirectly into a Basic Treatment Receiving Water.

□ **FIXED.**

We discussed this at the 5/14 meeting with Ecology and believe we reached consensus on approval for the City's intent, although word changes are required to clarify the requirement. SMC 22.805.090.B.4 has been added, which reads:

4. A basic treatment facility shall be required for all projects. The requirements of 22.805.090.B.4 (oil control treatment), 22.805.090.B.5 (phosphorus treatment), 22.805.090.B.6 (enhanced treatment) below are in addition to this basic treatment requirement.

To summarize the thresholds:

Treatment is not required for SFR projects because, by definition, these projects will have < 5,000 ft² of new plus replaced PGIS.

Treatment is not required for Sidewalk/Trail Projects because, by definition, these projects will not have pollution-generating impervious or pervious surfaces.

Basic Treatment is required for all Parcel-based projects having ≥ 5,000 ft² of new plus replaced PGIS.

Basic Treatment is required for all Roadway projects having ≥ 5,000 ft² of new plus replaced PGIS. Note that this threshold is significantly lower than Ecology's. Our assessment is that if we were to incorporate Ecology's threshold for treatment for road-related projects, which requires a 50% or more increase in road surface, virtually no new stormwater treatment facilities would be constructed for Seattle's roadways as a consequence.

Oil control treatment, phosphorus treatment, and enhanced treatment are additional requirements to basic treatment.

22.805.090.B.1.b does not make sense. It does not adequately identify a water quality design flow rate.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We agree, and have developed the below verbiage, which we propose to use, subject to Ecology's approval.

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Water quality treatment facilities shall be installed and maintained to treat flows from the pollution generating pervious and impervious surfaces on the site being developed. When stormwater flows from other areas, including non-pollution generating surfaces (e.g. roofs) and offsite areas, cannot be separated or bypassed, treatment BMPs shall be designed for the entire area draining to the treatment facility. Stormwater treatment facilities are designed based on the stormwater runoff volume from the contributing area or a peak flow rate as follows:

1. The daily runoff volume at or below which 91 percent of the total runoff volume for the simulation period occurs, as determined using an approved continuous model. It is calculated as follows:
 - a. Rank the daily runoff volumes from highest to lowest.
 - b. Sum all the daily volumes and multiply by 0.09.
 - c. Sequentially sum daily runoff volumes, starting with the highest value, until the total equals 9 percent of the total runoff volume as calculated in Step b. The last daily value added to the sum is defined as the water quality design volume.
2. Different design flow rates are required depending on whether a treatment facility will be located upstream or downstream of a detention facility:
 - a. For facilities located upstream of detention or when detention is not required, the design flow rate is the flow rate at or below which 91 percent of the total runoff volume for the simulation period is treated, as determined using an approved continuous runoff model.
 - b. For facilities located downstream of detention, the design flow rate is the release rate from the detention facility that has a 50 percent annual probability of occurring in any given year (2-year recurrence interval), as determined using an approved continuous runoff model.

22.805.090.B.5 incorrectly exempts treatment of new impervious road surfaces if the criteria in subsections a. and b. aren't met. 5,000 sq. ft. or more of new PGIS in a TDA requires treatment regardless. 5.a. is different from the Ecology requirement. What is meant by "project" in subsection a? It would seem more explicit to say new, or new plus replaced – whichever is intended. The 50% criterion is only used by Ecology to trigger application of treatment and flow control to replaced impervious surfaces. What is Seattle's intent?

□ CITY/ECOLOGY NEED TO DISCUSS.

We believe this has been corrected by the slight rewording of the pertinent requirements and changes made earlier in this subsection (see above), which more explicitly state the requirement for basic treatment at a threshold of $\geq 5,000 \text{ ft}^2$ of *new plus replaced* PGIS. This was our original intent. Our understanding of enhanced treatment is that Ecology only requires this for road-related projects

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discharging to fish-bearing receiving waters when: (1) there is 5,000 ft² or more of *new* impervious surface, (2) the stated AADT has been exceeded, *and* (3) the new impervious surface adds 50% or more to the existing impervious surfaces within the project limits. The requirement for enhanced treatment (now paragraph 6) has been reworded as shown below.

<u>5.8.</u>	<u>An enhanced treatment facility shall be required for a roadway project or the roadway project portion of a joint project if the new impervious surfaces total 5,000 square feet or more, and all of the following criteria are met:</u>
<u>a.</u>	<u>The project that discharges to a fish-bearing stream or lakes, to waters or drainage systems that are tributary to fish-bearing streams, creeks, or lakes sites, and which meets the following criteria:</u>
<u>a.b.</u>	<u>The new impervious surfaces add 50% or more to the existing impervious surfaces within the project limits. The project totals 50% or more of the existing impervious surfaces within the project limits. The project limits shall be defined by the length of the project and the width of the right-of-way.</u>
<u>b.c.</u>	<u>The site is a fully controlled or partially controlled limited access highway with an Annual Average Daily Traffic (AADT) count of 15,000 or more, or any other road with an AADT of 7,500 or greater.</u>

Chapter 22.807 Drainage Control Review and Application Requirements

Provide an explanation of the intended difference between Standard Drainage Control Review and Large Project Drainage Control Review. What is magical about the one acre or more of LDA in this context? The 5,000 sf threshold is phrased “new *or* replaced” – should this be “and”? For projects that convert between ¾ acre and 1 acre to lawn/landscape, would an engineered facility be effectively reviewed under Standard Drainage Control Review?

☐ **RECOMMEND NO FURTHER ACTION.**

The key difference between Standard Drainage Control Review & Large Project Drainage Control Review is that the latter requires the developer to obtain a Professional Engineer's review & approval. The intent is to require a more detailed review for projects that are likely to have more complex drainage issues, site conditions, and which may require modeling and design of treatment or flow control facilities. Our threshold has been set at 5,000 ft² or more of new plus replaced impervious surface for some time and seems to meet the intent.

The one acre or more of land disturbing activity is based on Ecology's threshold for construction sites to obtain an NPDES permit.

☐ **FIXED.**

The phrase should be “new *plus* replaced” impervious surface.

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□ **FIXED.**

Subsection 2 of SMC 22.807.A (Drainage Control Review and Application Requirements) has been rewritten to ensure land conversion activities are subject to large project review.

2. Large project drainage control review and approval shall be required for projects that include:
- a. Five thousand (5,000) square feet or more of new ~~or~~ plus replaced impervious surface; or
 - b. One (1) acre or more of land disturbing activity; ~~or-~~
 - c. Conversion of 3/4 acres or more of native vegetation to lawn or landscaped area; or
 - d. Conversion of 2.5 acres or more of native vegetation to pasture.

Section 807.020.B indicates that Construction Stormwater Site Plans must conform to Section 804, but the citation is n/a. Should this be 805.020.D?

□ **FIXED.**

The correct reference (805.020.D) has been inserted in subparagraphs 807.020.B.1.b and 807.020.B.2.d.

Section 807.020.B.1.b allows submittal of a checklist I lieu of a Construction Stormwater Control Plan. Is this the checklist in Volume 2 Table 1a? The checklist must cover all construction elements, must indicate BMP's that will be used, and must note when an element is not applicable.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

[See our response under "General D comment" earlier in this document.]

Information on Modification to Western Washington Hydrology Model (Encl. #9)

The WWHM3 representation of a bioretention swale is acceptable.

□ **RECOMMEND NO FURTHER ACTION.**

Much appreciated.

The WWHM3 Eco-roof hydrology model is also acceptable. If Seattle is able to provide more accurate calibration and modeling options (such as growth material porosity) as a result of additional roof monitoring, please submit those proposals to Ecology.

□ **RECOMMEND NO FURTHER ACTION.**

We are continuing to work to improve the Eco-roof hydrologic model.

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DIRECTORS RULES

Volume 2 – Construction Stormwater Control TRM

General

- Notes regarding the relevant code content are also provided (above). As a practical matter, the director's rules should include sufficient statements to be equivalent to Appendix 1. The private project managers and the public project reviewers only look to the rules for determining what must be done at a site. Many of the details in Appendix 1 of the Permit do not appear anywhere within Chapters 2, 3, or 4 of Volume II, including the following Elements from Appendix 1:
 - 1.b
 - **FIXED.**
Added to checklists, and to BMP E1.30: Preserving Natural Vegetation.
 - 2.a.
 - **FIXED.**
Added to BMP E2.10: Stabilized Construction Entrance.
 - 2.d.: The reference to cleaning at the end of the day or more frequently during wet weather. Seattle's use of "immediately" is open to interpretation
 - **FIXED.**
Revised to incorporate Ecology's language.
 - 2.e. No statement regarding pumping back on-site or otherwise prevented from discharging into systems tributary to waters of the state.
 - **FIXED.**
Added to BMP E2.10: Stabilized Construction Entrance. However, the City is not including the option to pump back onsite.
 - 3.b. and c.
 - **RECOMMEND NO FURTHER ACTION.**
Note that this is already present in the Stormwater Code [XXX Cite location.] However, we have added additional clarification in response to this comment.
 - 4.a., b. and c.
 - **RECOMMEND NO FURTHER ACTION.**
This is already incorporated into the Stormwater Code [XXX Cite location.]

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and we do not believe it necessary to try to fit this particular set of requirements into the Directors' Rule (Volume II).

- 5.e.
 - FIXED.
Added to Section 4.1.1.
- 6.a., b.
 - RECOMMEND NO FURTHER ACTION.
This is already reflected to a degree in BMP E2.65: Pipe Slope Drains. However, the exact text is reflected in the Code [XXX Cite location.].
- 6.c. No reference to the land cover assumptions for the analysis.
 - FIXED.
This has now been incorporated into the Directors' Rule (Volume II).
- 6.d. Only covered under the dewatering BMP
 - FIXED.
Added to BMP E2.65: Pipe Slope Drains.
- 6.e.
 - FIXED.
Added to BMP E2.35: Check Dams.
- 7.b.
 - FIXED.
Added to BMP E.25: Storm Drain Inlet Protection.
- 8.b. No reference to the land cover assumptions for the analysis
 - CITY/ECOLOGY NEED TO DISCUSS.
We assume you meet 8.a. If so, it has been fixed by adding verbiage to the Directors' Rule (Volume II).
- 9. b.
 - FIXED.
Added to BMP EC1.15: Material Delivery, Storage, and Containment.
- 9.c. and e. may be covered adequately by reference to Volume 1, but it can get lost in the clutter.

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- RECOMMEND NO FURTHER ACTION.
This seems to be appropriately covered in the Stormwater Code. Also, element “c” is included in Section 5.1.2.5 of the Directors’ Rule (Volume II).
- 9.f. Text does not mention adjustment of pH if necessary to....
 - FIXED.
Added to BMP C1.20: Use of Chemicals During Construction.
- 9.g.
 - FIXED.
Added to BMP C1.20: Use of Chemicals During Construction.
- 10. b., c. and d.
 - FIXED.
Added to BMP C1.40. Temporary Dewatering.
- 12.d does not have sufficient direction for modification of the SWPPP on large projects whenever there is a change in design, construction, operation or maintenance that has ... This statement does not appear at all for small projects.
 - FIXED.
Language added to Section 2.3.1 and 2.3.2.

Section 2.3.1 exempts small projects from elements 1,3, 8, and 10. It is OK to say that these elements may not apply to sites of this size. However, Appendix 1 requires that all elements be considered “unless site conditions render the element unnecessary and the exemption from that element is clearly justified” (Appx 1, page 13). Thus, they should not be classified as recommended, they should remain as required elements, and the plan writer should explain why they are not applicable to the subject site.

□ CITY/ECOLOGY NEED TO DISCUSS.

[See our response under “General D comment” earlier in this document.]

Seattle offers a “Temporary Erosion and Sediment Control Standard Plan” to help small projects meet submittal requirements. Seattle must submit that for Ecology review.

□ CITY/ECOLOGY NEED TO DISCUSS.

We are submitting our standard plan with this annotated response. We believe it meets or exceeds Ecology’s requirements, but has listed this as a discussion item in case Ecology has recommendations for improvement.

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Chapter 3 Checklists (Tables 1a and 1b)

- Control Flow Rates:
 - The checklist should include the practice of constructing the permanent flow control facility, and reference the correct volume.

□ **FIXED.**
Language added to checklist.
 - Turbidity curtains are not functional for controlling flow rates. They should not be listed in the checklist in that section.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We could not find where turbidity curtains are listed in the checklist for controlling flow rates.
- Install Sediment Controls:
 - The regulations do not say that runoff from disturbed areas must pass through an appropriate sediment removal BMP prior to leaving the site or discharging to an infiltration facility. The checklists give the impression that only sediment ponds and traps are required. But the details for those BMP's indicate that they apply only to larger sites of 1 and 3 acres or more respectively.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We are not in full agreement with Ecology's comments. See Section 22.805.020.B.11 of the Stormwater Code, which provides requirements for runoff leaving a site. Also, we do not believe our checklists give the impression that only sediment ponds and traps are required. Moreover, the details of these BMPs do not indicate that they are only for larger sites. We would like to review with Ecology any recommended wording changes that would allow Seattle to be even more clear on this point.
- Section 5 in both checklists is inappropriately titled "Retain Native Top Layer." It should read "Stabilize Soils."

□ **FIXED.**
Wording has been revised.

BMP E 3.40 Sediment Trap – Because the City is requiring use of continuous runoff modeling for sizing flow control facilities and many treatment facilities, it may want to allow designers to use the continuous runoff model to size sediment traps and ponds as an alternative to using single

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event methods. The City may choose to add an alternative method for identifying Q2. Ecology suggests the following:

Q2 = Design inflow (cfs) based on the 2-year flow rate (1 hour time step in an approved continuous runoff model) for the developed (unmitigated) site, multiplied by a factor of 1.3. The 10-year peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. Q10 is the 10-year flow rate (1 hour time step in an approved continuous simulation model) for the developed (unmitigated) site multiplied by a factor of 1.6.

□ **FIXED.**

We will be using a 15-minute time step with no correction factor.

BMP E 3.45 Sediment Pond

- The definitions for Q2 and Q10 are the same as those used above for traps. If you want to allow use of continuous runoff modeling, you will have to add parallel continuous runoff terms. For example, you don't use the peak flow for the 2-year event, you use the 2-year, 15-minute flow rate predicted by a continuous runoff model.

□ **FIXED.**

We will be using a 15-minute time step with no correction factor.

- The guidance for the Principal Spillway can have an alternative flow design when using continuous runoff modeling. We suggest adding, "If using the WWHM or MGS Flood, Q10 is the 10-year flow rate (1 hour time step) for the developed, unmitigated site multiplied by a factor of 1.6."

□ **FIXED.**

We will be using the 10-year recurrence interval flow with a 15-minute time step (or shorter).

- For the Emergency Spillway, also note that the 100-year peak flow identified by the approved runoff models is a 1-hour flow rate. If you want to estimate a flow rate appropriate for a 15-minute time step (single event methods use a 6 or 10 minute time step), we suggest multiplying the 1-hour rate by 1.6.

□ **FIXED.**

We will be using the 100-year recurrence interval flow with a 15-minute time step (or shorter).

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BMP E 3.50 – This is a BMP not covered in Ecology's stormwater manual. Design criteria for Sedimentation Tank; how was this equation developed? Also, the note in the text box indicates that sites not covered under the Ecology Construction Stormwater General Permit, and proposing to use chemicals for flocculation must get approval from DPD (Seattle). This note should indicate that any site proposing to add chemicals to stormwater must receive approval from Ecology, regardless of their size and regardless of their coverage or lack of coverage under the Construction Stormwater General Permit.

□ **FIXED.**

We will require Ecology approval prior to using chemical additives.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

At issue is the equation for sizing a sedimentation tank. Seattle's proposed criteria is as follows:

Pump Discharge in gallons per minute (G.P.M.) X 16 = cubic feet storage

The value of 16 is a conversion factor between gallons and cubic feet and is based on two hours of pumping.

1 Gallon/minute X 120 minutes X 0.13368 cubic feet/gallon = 16.04 cubic feet

The genesis for using a two-hour pumping period is uncertain. Conversations with one of the nationwide sediment tank vendors on the subject indicated that there was no set formulae or rules of thumb; much reliance is placed, rather, on professional judgment. We believe it useful to provide a minimum sizing. However, we are aware of various design standards in technical manuals of other jurisdictions:

For example, Idaho, New York, Chattanooga, use the same equation as Seattle's.

- (1) *New York Standards and Specifications for Erosion and Sediment Control* (August 2005) at <http://www.dec.ny.gov/chemical/29066.html>
- (2) *Catalog of Stormwater BMPs for Idaho Cities and Counties* (September 2005) at http://www.deq.state.id.us/water/data_reports/storm_water/catalog/
- (3) *Stormwater BMP Manual: Best Management Practices* (January 2008) at <http://www.hamiltontn.gov/WaterQuality/BMP.aspx>

Illinois, in contrast, uses a four-hour storage.

Illinois Urban Manual Practice Standards (November 2002) at <http://p2pays.org/ref/02/01524/index.html>

Wisconsin's sizing is based on a calculated surface area.

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*Wisconsin Department of Natural Resources Conservation Practice Standard at
http://dnr.wi.gov/runoff/pdf/stormwater/techstds/erosion/Dewatering_1061.pdf*

*Use one of the following methods to size a tank: a. Settling: Account for settling of the suspended sediments with the following equation: $Sa = 1.83 * Q$;*

where

Sa = Tank surface area (sq ft)

Q = Pumping rate (gallons per minute)

Note: 1.83 is a factor that includes the conversion from gpm to cfs (1 gpm = 0.0022 cfs) and the particle settling velocity for Soil Class 1 (0.0012 ft/sec) from WDNR Conservation Practice Standard 1064 Sediment Basin.

In the absence of other clear guidance from Ecology and in light of the fact that this BMP is particularly well suited for projects that occur in Seattle's ultra-urban setting, we would prefer to keep the current minimum design requirement, bearing in mind that users may be required to increase the size should it be determined to be insufficient.

BMP E-3.55 – Construction Stormwater Chemical Treatment; such system need be designed by a professional engineer. Seattle's manual is silent on that. Again, all sites proposing to add chemicals to stormwater must receive an approval for that action from the Ecology.

□ **FIXED.**

We will require licensed professional engineer.

BMP C1.40: Temporary Dewatering

- The text lists Jersey Barriers lined with Geotextile, and an Enclosure of Hay Bales, Silt Fence or Boths as options. Ecology does not consider those as viable options for removing sediment from dewatering.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We removed Geotextile, kept hay bales, changed silt fence to filter fabric BMP E3.0, and added sediment filter bag as options. We believe it is appropriate to use these options.

- How is dewatering from contaminated sites handled? Explain.

□ **RECOMMEND NO FURTHER ACTION.**

We believe this is addressed already via text that says, "If contamination may be or is present, the city reserves the right to require sampling and analysis to prove that water quality is being protected. Contact DPD to get assistance in identifying the required parameters of concern and any specific sampling requirements. Highly turbid or contaminated dewatering water shall be handled separately from stormwater." We also have added text that says, "In addition to sediment, if the collected water is contaminated with oil, grease, or other

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petroleum products, an oil/water separator or a filtration mechanism may be necessary prior to the discharge. Another disposal method may be using a vendor for collection, transport, and offsite disposal.”

Volume 3 – Flow Control and Treatment TRM

Note that relevant questions and comments regarding the Code (above) apply to Volume 3 as well. Any changes necessary based on code comments would need to be reflected appropriately in Volume 3.

Chapter 2

Figure 2.1 refers to a Table 2.6, which is n/a (probably misnumbered)

□ **FIXED.**

We have made a number of revisions to this volume, among which have been to verify and validate cross-references.

Section 2.6 Special Circumstances (pg 2-35) – Explain how these projects would be regulated. The text implies that discretion is available to “identify the specific minimum requirements to be applied.” When a project has a special circumstance, all the minimum requirements still apply. There may be alternate means to achieve the desired outcome, however, and that is what the Adjustment criteria are for.

□ **CITY/ECOLOGY NEED TO DISCUSS.**

We added a short section titled, “Special Circumstances” in Volume 3 to account for the fact that some projects do not cleanly fit into either the City’s or Ecology’s set of project types and thresholds. For example, although Seattle has chosen not to incorporate Ecology’s threshold discharge area (TDA) approach for determining minimum requirements for the majority of projects in the City, it may be appropriate to use a TDA-like approach for a limited number of specifically listed project types, such as over-water structures, tunnels, and projects spanning multiple drainage basins. Some project types are listed as Special Circumstances, such as multiple blocks and subdivisions, in order for us to evaluate whether an integrated drainage plan would be appropriate, as we did with Seattle Housing Authority’s High Point site. Some project are included as special circumstances for reasons that go beyond just specific minimum requirements. At issue with permanent dewatering, for example, is sampling, reporting, payment of wastewater fees, sewer capacity, and more. Alleys and closed contour basins are special circumstances because of the often severely limited options available to address discharges. Such considerations need to be addressed earlier, rather than later in the permitting and review process. Railroads, as far as we can determine, are not specifically addressed in Ecology’s minimum requirements, but are treated like all other non-roadway projects. We list railroad projects here because of issues related to:

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impervious surface determination, drainage patterns, multiple basins, access, right-of-way, and jurisdictional authority.

Table 2.3 indicates that no treatment is required for small lakes. Explain.

□ **FIXED.**

Chapter 2 has been rewritten to account for revisions to the Stormwater Code resulting from our discussions with Ecology. This includes correcting the erroneous table. We have always intended for treatment to be required for discharges into Seattle's small lakes, continuing current practices.

In tables 2.2, 2.3, and 2.4, projects discharging to a designated receiving water in a non-capacity restrained system do not have to use green infrastructure. This is a deviation from the requirement for all projects above 2,000/7,000 to use on-site management BMP's. Refer to earlier comments regarding Flow Control – General on the Code and Enclosures.

□ **FIXED.**

Our requirement for projects to implement Green Stormwater Infrastructure to the maximum extent feasible is now independent of the water into which they discharge.

Chapter 5

Section 5.2.3 – The City lists three continuous runoff models not approved by Ecology: InfoWorks, Mouse, and ModFlow HMS. Ecology will need to approve any continuous runoff models proposed for use.

□ **FIXED.**

The sentence before the three Ecology-approved models has been revised to state, "Approved continuous hydrologic models for use in designing flow control and water quality facilities in accordance with the minimum requirements outlined in Chapter 2 include:" In addition, a sentence was added before the three non-Ecology approved models that says "In addition, the following continuous hydrologic models may be used for project specific situations not directly related to compliance with the minimum requirements outlined in Chapter 2."

Table 5.4 and the text of Section 5.4.2.3 would lead the reader to believe that single event methods are acceptable for flow control purposes. This conflicts with earlier text and Table 5.1. Please explain.

□ **FIXED.**

A sentence has been added before Table 5.4 stating, "Note that this table does not override the modeling requirements for specific facilities outlined in Chapters 2, 4, and 5 or Table 5.1. Table 5.4 is for general guidance and applicability only."

Chapter 6

Seattle will need to explain the bases for the credits given in Tables 6.2 through 6.5.

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□ **RECOMMEND NO FURTHER ACTION.**

A memo providing the basis of the proposed flow control credits for new and retained trees has been submitted. Discussions are continuing with Ecology on the subject.

The facility sizing factors and impervious surface reduction credits in Tables 6.4 and 6.5 were primarily developed by sizing facilities in WWHM3pro to achieve flow control standards (see response to the next comment for more detail on standards). Modeling was used to size the following facilities: bioretention cells without underdrains, permeable pavement facilities, permeable pavement surfaces (with low slopes), dispersion, cisterns, infiltration trenches, dry wells, detention vaults, and detention pipes. The modeling assumptions and methods were per the requirements outlined in the "facility modeling" sections for each BMP. The modeling was performed at a 5-minute time step using a 25-year 5-minute rainfall record for the Seattle area (developed by MGS). The 158-year precipitation record is not yet incorporated into WWHM. Existing conditions were assumed to be till soil with a moderate slope.

Engineering judgment was used to develop impervious surface reduction credits for vegetated roofs and pervious pavement surfaces at slopes greater than 2 percent. Because Seattle believes that the WWHM3 eco-roof module currently overestimates peak reduction, the proposed flow control credits were set at a more conservative level. The eco-roof module is to be recalibrated and it is anticipated that the recalibrated model will produce reasonable flow control results. In the mean time, Seattle is reviewing the flow control credits proposed and may wish to modify them based on recent modeling and monitoring data.

At this time it is not possible to explicitly model the performance of a permeable pavement surface at a slope without the presence of subsurface impermeable berms or other design features to create subsurface storage. Therefore, the performance of a permeable pavement surface with a slope between 2 and 5 percent was estimated as half of the performance of flat permeable pavement surface.

The WWHM module developed for bioretention planters with underdrains may underestimate flow control performance. Flow control credits for bioretention planters with under drains are under development and may need to be based on professional judgment until modeling methods are improved.

Table 6.5: Is the basis for the sizing factors the ability of the device to meet flow peaks and durations from 50% of a 2-year to a 2-year flow for a pasture condition? If so, the simplified approaches should not be used to size treatment facilities serving > 5,000 sq. ft. of PGIS, nor flow control facilities serving > 10,000 sq. ft. impervious area in basins that must meet the NPDES permit's default flow control requirement (50% of 2-year through the 50-year for an historical or existing land cover). In addition, the tables should not be used for giving flow reduction credit for using the BMP's within areas that must meet the NPDES default flow control requirement.

□ **RECOMMEND NO FURTHER ACTION.**

The sizing factors presented in Table 6.5 are only for sites where the total new

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and/or replaced impervious surface area does not exceed 10,000 square feet. There are two factors presented: the first is for "Flow Critical Receiving Waters" to meet the ½ 2-year to 2-year pasture peak and duration standard and the second is for "Public Combined Sewer/Capacity Constrained Basins" to meet Seattle's peak flow control standard. At this time Seattle does not intend to develop sizing factors for the NPDES permit default standard because the areas subject to this requirement have limited development potential.

Tables 6.5 and 6.7: Please inform us when you have a proposal to replace the sections that are "under development."

☐ **RECOMMEND NO FURTHER ACTION.**

The sizing factors for detention pipe have been developed. A flow control credit for bioretention planters is currently under development.

Section 6.3.3.4: What is the basis for the 0.25 inches per hour design infiltration rate?

☐ **RECOMMEND NO FURTHER ACTION.**

See the attached memo entitled "Recommended Baseline Infiltration Rate for Design" prepared by Seattle Public Utilities Materials Laboratory.

Tables 6.6, 6.8, 6.9, 6.11, 6.12, 6.14, 6.18, and 6.20 indicate assumptions to use for the simplified method. Those are acceptable because they apply to sites that do not exceed the flow control threshold. However, what should the user do when they want to model distributed bioretention facilities, vegetated roofs, porous pavement, etc. in drainage basins that exceed the 10,000 sq. ft. threshold or the 0.1 cfs increase threshold? They cannot use the assumptions in the simplified tables because the flow control standard upon which they are based is not applicable.

☐ **RECOMMEND NO FURTHER ACTION.**

For each flow control BMP, there are two subheadings under "BMP Sizing". The first, "Simplified Sizing Approach" is for smaller sites (less than 10,000 square feet of new and/or replaced impervious surface). Sizing factors and design requirements are provided so that facility modeling is not necessarily required. Following that section is the "Facility Modeling" section that provides modeling assumptions and methods for sizing flow control BMPs for larger sites (exceeding 10,000 square feet) and for smaller sites where the designer chooses to use facility designs other than those provided in the simplified approach. At this time Seattle does not intend to develop sizing factors for the NPDES permit default standard.

Section 6.4.1.3: Performance objectives for bioretention facilities – This section indicates that treatment requirements are met if the 91st percentile, 24-hour volume infiltrates through the treatment soil layer within 48 hours. That is not correct. See the comment on sections 7.8.2 and 7.8.5 below.

☐ **FIXED.**

See above.

Section 6.4.1.4.

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- The subsection on bioretention soil indicates that for flow control credit, the soil must meet COS specification 9.14. Please provide the specification. We could not find it in the submitted materials.

☐ **RECOMMEND NO FURTHER ACTION.**

The soil specification and supporting information has been submitted for review.

- In regard to facility modeling, it would seem more direction is needed. We had understood that Seattle had worked with Clear Creek Solutions to create a standard modeling approach for bioretention systems with and without underdrains. It seems that the section of the manual on bioretention should reference the appropriate icon and screens to use and summarize the modeling.

☐ **RECOMMEND NO FURTHER ACTION.**

The section for bioretention will explicitly reference the WWHM module ("button") for bioretention and provide general guidance for acceptable modeling methods (e.g., infiltration on side slope allowed when side slopes are 3H:1V or flatter). Detailed guidance for the module is being developed by Clear Creek Solutions and will be part of the model help menu.

Section 6.4.1.5

- The first paragraph reference to Figure 6.5 should be changed to Figure 6.4.

☐ **FIXED.**

Thank you.

- How can a bioretention planter be used to meet the flow control requirement when it has an underdrain as a standard design feature?

☐ **RECOMMEND NO FURTHER ACTION.**

While it is likely that the bioretention planter (with impermeable reservoir and underdrain) will not be capable of achieving flow control standards, a flow control benefit may be provided via attenuation as the water percolates through the bioretention soil and is detained in the ponding reservoir. The numerical flow control credit is currently under development. Documentation will be submitted for review when it is available.

- Does the WWHM bioretention cell approach with an underdrain apply here?

☐ **RECOMMEND NO FURTHER ACTION.**

Yes. However, the flow control performance may be underestimated by the current model.

Section 6.4.2 Pervious Pavement – The designs all seem to assume that water which has entered the aggregate base cannot resurface by moving laterally. This can occur where the road is elevated above an adjacent roadside ditch. There should be some text to indicate that the storage

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volume in the aggregate is not only restricted by an overflow pipe, but also by the invert of an adjacent ditch.

□ **RECOMMEND NO FURTHER ACTION.**

The lateral subsurface movement of water has been explicitly addressed. Impermeable subsurface berms (or other methods for providing subsurface ponding) are to be required for slopes exceeding 2 percent.

Section 6.4.2.3 – Same comment as for Section 6.4.1.3. Also see the comment on sections 7.8.2 and 7.8.5 below.

□ **FIXED**

Section 6.4.2.4

- For designs that use an underdrain, does the City intend to allow any flow reduction credit? If so, please explain why. If Ecology accepts the explanation, then additional modeling directions are needed in the text. If Ecology rejects the explanation, the City should add text to make that explicit.

□ **RECOMMEND NO FURTHER ACTION.**

Seattle proposes to provide flow control credit for permeable pavement facilities with an underdrain *and* flow restrictor. The flow restriction (orifice control on the underdrain pipe) would allow the storage reservoir to act as a subsurface detention system. The designer would be responsible for demonstrating that the facility achieves flow control goals.

- The bullet below Table 6.9 does not specify the aggregate base material.

□ **FIXED.**

Aggregate requirement has been provided.

- Table 6.10 – Is there a “pervious pavement facility” icon in the Seattle WWHM?

□ **RECOMMEND NO FURTHER ACTION.**

No, the text has been revised to recommend that permeable pavement be modeled as a gravel trench with infiltration to native soil.

A porosity of 20 percent is allowed, but the specifications listed on page 6-47 allow down to 15% void space. There should be consistency here.

□ **FIXED.**

The text now consistently requires a minimum void space of 20 percent in the storage reservoir aggregate.

- Table 6.11 – The table seems to indicate that with as little as 2 inches of aggregate sub-base on roads with less than 2% slope, pervious pavement can match flows from ½ the 2-

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year to the 2-year. Did Seattle perform modeling that indicates that result? That seems hard to believe given that the porosity of the base is 15%. (yielding .3 inches of storage).

☐ **RECOMMEND NO FURTHER ACTION.**

Seattle did perform modeling per the assumptions and methods presented in the text. A design infiltration rate for the underlying sub-grade was assumed to be 0.25 inches/hour. For a permeable pavement surface, the ½ 2-year to 2-year pasture peak and duration standard was achieved with less than 1 inch of aggregate with 20 percent porosity. This minimum depth was increased to 2 inches to be conservative. Because a pavement *surface*-installation only manages the rain falling upon it (i.e., no runoff is directed to it), a small storage depth over a native soil with a low infiltration rate is capable of achieving significant flow control. Please let us know if you would like to see the modeling files.

Section 6.4.2.5 (Page 6-54) – The first sentence references section 6.4.1.5 bioretention planters, rather than a section establishing design criteria for pervious pavement.

☐ **FIXED.**

This has been corrected.

Also, the third paragraph says that pervious pavement surfaces may be modeled using the assumptions in 6-10 except for no overflow or underdrain. It should also indicate that the user should enter only the depth of aggregate base that can store water.

☐ **RECOMMEND NO FURTHER ACTION.**

Because permeable pavement *surface*-type installations manage only the rain falling upon it (i.e., no runoff is directed to it, as with a *facility*-type installation), Seattle proposes allowing that the void space in the entire section of *surface*-type installations be modeled as a storage reservoir.

Table 6-10 indicates that the storage reservoir must be 6-inches below the surface of the pavement. Do you want to retain that for pervious surfaces?

☐ **RECOMMEND NO FURTHER ACTION.**

The 6-inch distance between the wearing course surface and the invert of the overflow pipe is intended to address freeze/thaw concerns in *facility*-type installations. Because surfaces manage much less water, this is not a serious concern for surfaces and the 6-inch depth requirement is not proposed.

Section 6.4.3.5 (Page 6-63) Vegetated Roofs – Clarify the following statement from the first paragraph:

Because the flow control standard for flow critical basins cannot typically be achieved using a vegetative roof, the flow control credit may be calculated as the lesser of the percent of the peak or duration reduction achieved.

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How do those directions help the user get credit for vegetated roofs in a drainage basin that exceeds the Ecology flow control thresholds?

□ **RECOMMEND NO FURTHER ACTION.**

Continuous modeling assumptions for vegetated roofs are provided in Table 6.13. These modeling assumptions and methods are to be used regardless of the target flow control standard. The statement in questions was in error and has been revised to state: "Because the flow control standard for flow critical basins cannot typically be achieved using a vegetative roof, additional downstream flow control measures may be required."

Section 6.4.6.4 (Page 6-79) Table 6-16: New Tree Credits – Please explain the bases for your credits. It would seem a separate set of credits is necessary for trees planted within drainage areas that must meet the NPDES permit default standard.

□ **RECOMMEND NO FURTHER ACTION.**

A memo providing the basis of the new and retained tree credits proposed has been submitted. Credits were developed based on an extensive literature review. At this time, there is insufficient data to further refine flow credits by standards. Seattle believes the credits to be conservative and appropriate for application throughout the City.

Section 6.4.6.5: Page 6-81: Table 6-17: Retained Tree Credits – Please explain the bases for your credits. It would seem a separate set of credits is necessary for trees planted within drainage areas that must meet the NPDES permit default standard.

□ **RECOMMEND NO FURTHER ACTION.**

See response above.

Section 6.4.7.3 Design Criteria for Dispersion Trenches – Please explain why Seattle proposes to cut the minimum flow path distance in half (from 50 feet to 25 feet) as a condition of modeling the roof area as grass.

□ **FIXED.**

The divergence from the 50 foot flow path was a mistake and has been corrected.

Section 6.5.2.1: Infiltration Trenches – The design criterion on the bottom of page 6-96 is incorrect for the same reasons specified above for Section 6.4.1.3 and Sections 7.8.2 & 5 below.

□ **FIXED.**

This has been corrected.

Page 6-143 – In equation 8, the square root symbol should not extend over the quantity $(h - (a/3))$. This is a mistake in the Ecology manual.

□ **FIXED.**

This has been corrected.

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Chapter 7

Table 7.9 – Please delete St. John's Wort from the list of suitable groundcovers. It is a nuisance species.

□ **FIXED.**

St. John's Wort has been eradicated from the list of suitable groundcovers.

Sections 7.8.2 and 7.8.5 – Section 7.8.2 states that treatment requirements are met if 91% of the runoff volume can infiltrate within 48 hours. Section 7.8.5 states that “*Infiltration treatment* (i.e., an infiltration basin or trench) meets the requirements for *basic, phosphorus, and enhanced* treatment if the 91st percentile, 24-hour runoff volume (indicated by an approved continuous hydrologic model) is successfully infiltrated within 48 hours maximum.” Both statements are incorrect. Infiltration facilities for treatment must be sized to infiltrate at least 91% of the entire influent runoff file. In addition, as a check on whether the facility has enough down-time to allow aeration, the 91st percentile, 24-hour runoff volume must infiltrate within 48 hours. This can be calculated using a horizontal projection of the infiltration basin mid-depth dimensions and the estimated long-term infiltration rate.

Additionally, we suggest that the City require verification testing for all infiltration facilities serving areas over 5,000 square feet - even those it is not accepting responsibility for. Given the vaguaries and difficulties in predicting large scale infiltration rates, it seems wise to verify performance. For example, King County requires testing and monitoring of an infiltration facility before accepting the facility. We can provide you with the method King County uses. Testing could also help establish a feedback loop for revising the standard design procedures.

□ **FIXED.**

We will require verification testing under certain circumstances of development. Currently, our intent is to require verification testing for projects infiltrating over 10,000 square feet of impervious area.

Section 7.8.7 – The next-to-last paragraph in this section also is incorrect for sizing bioinfiltration facilities. See the comment immediately above.

□ **FIXED.**

We have revised the WQ treatment requirements for infiltration.

Section 7.8.7.2 – The second method cited for sizing bioinfiltration facilities is incorrect. You do not use the water quality design storm to size infiltration facilities. You may follow the procedures in section 6.5.1.2 (B).

□ **FIXED.**

We understand the comment, but have removed bioinfiltration swales (formerly Section 7.8.7) as a BMP option.

Section 7.8.8 – For treatment purposes, bioretention facilities are required to meet the COS Specification 7-21. Please provide the specification. We could not find it in the submitted materials.

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□ **FIXED.**

The specification has been provided to Ecology via separate correspondence.

Section 7.9.8 and 7.9.9 – We suggest that brief additional sections referring to the section on sand filter basins for sand media specifications and sizing would be helpful to the reader.

□ **FIXED.**

We have added language to the basins, vault, and linear sand filter sections referring the designer back to previous sections for additional design information.

Section 7.10.8.3 – The next-to-last sentence on page 7-134 needs editing.

□ **FIXED.**

This sentence now reads “The wetpool volume for a combined facility shall be equal to or greater than the daily runoff volume at or below which 91 percent of the total runoff volume for the simulation period occurs, as determined using an approved continuous model.”

Section 7.12.3 – The SPU Director’s authority is restricted to allowing CUD technologies in accordance with or more stringent than the criteria under which Ecology has approved them.

□ **FIXED.**

Regarding Conditional Use Determination (CUD), we have deleted the sentence that read “The Director of Seattle Public Utilities has the authority to amend, add, or delete these technologies in the version of the Manual in use at the time the CUD is granted.”

Appendix D

Media Filters: The table lists standing water for 72 hours after a storm event as an indicator of infiltration capacity reduction. This should be changed to 24 hours.

□ **FIXED.**

The value has been changed to 24 hours,

Wet Biofiltration Swale: Sediment should be removed when it has accumulated to 2 inches over 10% of the treatment area.

□ **FIXED.**

The requirement has been changed to 10%.